

# REPORT

OF THE

WAR DEPARTMENT

1900

VOL. 1

UA

24

A15

PART 12.

REPORT

OF THE

MILITARY GOVERNOR

OF CUBA

ON CIVIL AFFAIRS

IN TWO VOLUMES

VOL. 2—IN FOUR PARTS

PART 1

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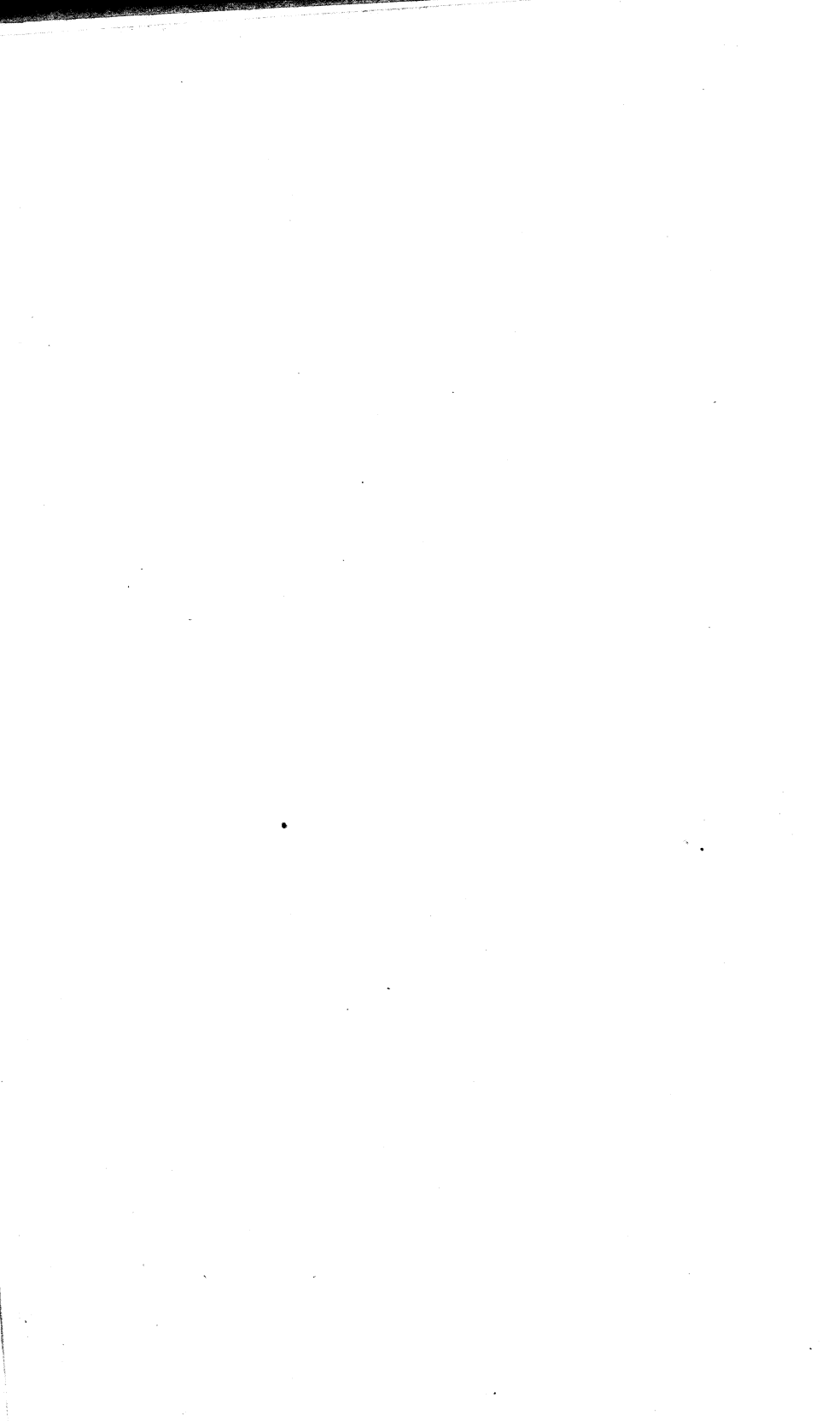
Sen. Russell A. Alger

5/23/03

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# ANNUAL REPORTS

OF THE

115193

# WAR DEPARTMENT

FOR THE

FISCAL YEAR ENDED JUNE 30, 1900.

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PART 12.

REPORT OF THE  
MILITARY GOVERNOR OF CUBA ON CIVIL AFFAIRS.  
IN TWO VOLUMES.

VOL. II—IN FOUR PARTS.

**Part 1.**

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WASHINGTON:  
GOVERNMENT PRINTING OFFICE,  
1902.



# ARRANGEMENT OF THE ANNUAL REPORTS OF THE WAR DEPARTMENT FOR THE YEAR ENDING JUNE 30, 1900.

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**VOLUME I.** Parts 1-13.—Report of the Secretary of War and all other reports except those of the Chief of Engineers and the Chief of Ordnance.

**VOLUME II.** Parts 1-8.—Report of the Chief of Engineers.

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REPORT OF THE MILITARY GOVERNOR OF CUBA ON CIVIL AFFAIRS.  
IN TWO VOLUMES.

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## PART 4.

Report of Maj. William M. Black, Corps of Engineers, U. S. A., chief engineer, Division of Cuba.

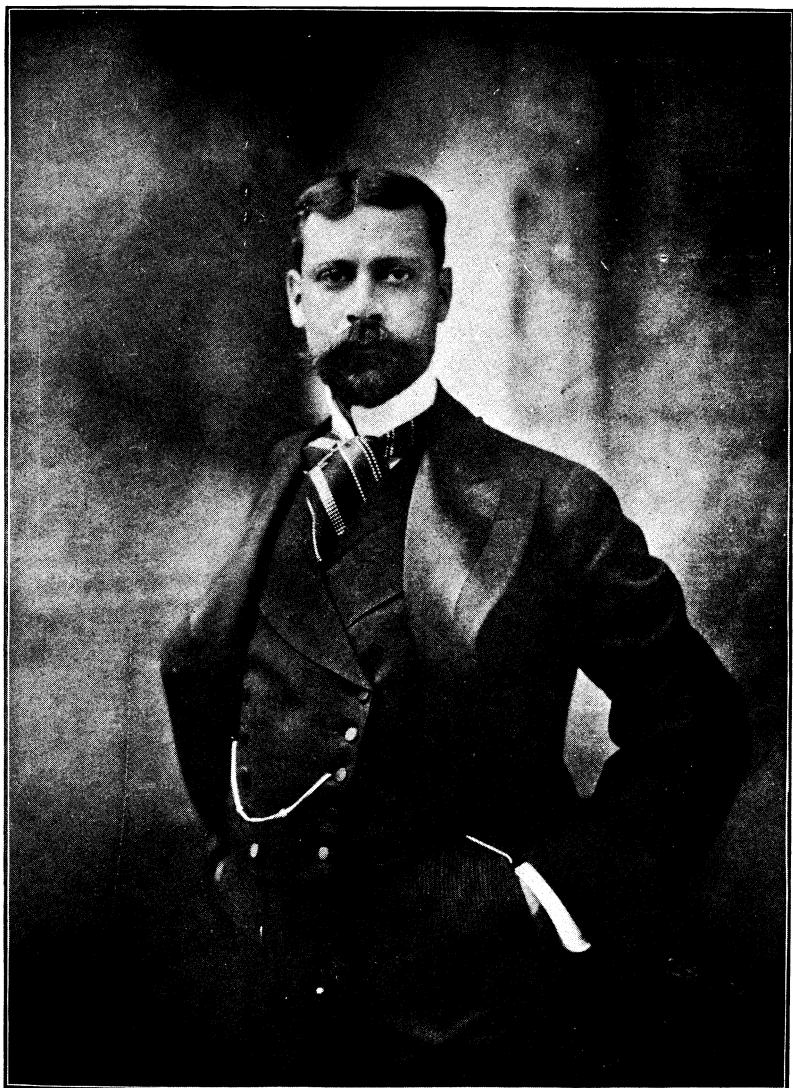
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JOSE RAMON VILLALON, SECRETARY OF PUBLIC WORKS.



# REPORT OF THE SECRETARY OF PUBLIC WORKS.

FOR THE YEAR ENDING JUNE 30, 1900.

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MILITARY GOVERNMENT OF THE ISLAND OF CUBA,  
DEPARTMENT OF PUBLIC WORKS,  
*Habana, September 25, 1900.*

SIR: In accordance with paragraph 9, of order No. 220, headquarters division of Cuba, series of this year, I have the honor to submit the annual report of the operations of this department, for the year ending June 30, 1900.

Respectfully submitted.

JOSE R. VILLALON,  
*Secretary of Public Works.*

MILITARY GOVERNOR OF THE ISLAND OF CUBA,  
*Habana.*

---

Having been honored by the appointment as secretary of public works, I assumed charge of the department during the first days of January of the present year.

As it is a custom in all countries to employ in public works citizens thereof, I deemed convenient, as a preliminary measure, to direct the engineers of provinces to employ, with preference, Cubans in the works that the department might have to perform.

At the same time I publicly requested that all such Cubans who might have rights or qualifications to occupy technical positions within the department should present their petitions to the same, with the object of utilizing their services as opportunities might offer.

As to the employees that I found in the department on assuming charge thereof, composed of Spaniards and Cubans, only those have been discharged who have shown themselves unqualified for the discharge of their duties.

## CONDITION OF THE DEPARTMENT DURING THE SPANISH RÉGIME.

My first efforts were in the direction of a complete reorganization of the department of public works, which in reality is beginning now to perform its functions within the new reorganization which has been given it, and for this reason the data that this report contains can not be very extensive.

The department of public works had in times of the Spanish Government an organization which, although in its form was somewhat alike to that which has been given it at the present time, nevertheless greatly differed in its method of working. Then there existed regional chief officers (each region embraced two provinces) and

the general management. Its actions were limited to the bounds of the budget that was prepared in the metropolis, in which budget public works received very little attention. Hardly even the most necessary appropriations were made for repairs to turnpikes already built and for the light-house service, ports, etc., the total expenditures of the department, including salaries, not exceeding \$300,000 per annum.

As the result of the said methods very few improvements were made during the long period of thirty-five years in which the department of public works was in charge of Spanish civil engineers. All the turnpikes existing to-day, as well as the construction thereof, light-houses, port improvements, etc., had been built at a former period by military Spanish engineers who had the said matters in their charge.

During the said period of thirty-five years only the necessary repair work was done, with the sole exception of a section of turnpike to Cabanas, and the light-houses of Punta Peregrina at Gibara, and Punta de Maya at Matanzas.

During the year 1899 the same organization as to employees continued and little new work was done, the same being limited to the commencement of the roads between Mantanzas and Canasi, in Mantanzas province, and from Canao to Manicaragua, in that of Santa Clara, little progress being made thereon, due to the fact that neither of them had been previously formally studied.

#### CONDITION OF THE DEPARTMENT AT THE COMMENCEMENT OF 1900.

At the commencement of the present year there was not throughout the entire department, with the exception of the province of Habana, a single set of instruments for surveys and field work, for which reason it was absolutely necessary to order them from the United States, from where they were received in the month of May; consequently, the sections of survey commenced their work from June. In Appendix A is shown the list of the instruments and their cost.

The said lack of instruments was one of the principal and inevitable causes of delay in pushing forward the surveys and works. Another cause of delay was the absolute lack in the department of steam road rollers and stone crushers, which had to be obtained with the necessary delay in the works.

The rains during the said time were another inevitable cause of delay and of increase in the cost of the works, not only on account of their having to be suspended while fixed expenses had continually to be paid, but also because of the fact of the roads having to be built upon vegetable earth without drainage, the rains would cause obstacles in building operations and considerably increase the expenses. In some places during the rainy season it has been deemed best to completely suspend the work, but, nevertheless, the time has been utilized in making surveys of routes and preparing the plans and estimates on the basis of information obtained, in order that the work might be continued when the rains ceased.

In the island of Cuba the best season of the year for the building of roads is from the first fortnight of November until the last days of May, which period is here known as the winter or dry season.

#### THE PRESENT ORGANIZATION OF THE DEPARTMENT.

In accordance with the reorganization of this department, which was approved on the 20th of February last, there has been established an office in each province, and the number of employees in each provincial office has been reduced to the number absolutely necessary for the regular business, there being in each one of them a chief engineer and a paymaster, one clerk, and one porter, the first two named being bonded for the faithful performance of their duties. The following table shows the regular employees of the department:

#### *List of regular employees of the department.*

##### OFFICES.

<b>Secretary's office:</b>		<b>Section of accounts:</b>	
Secretary of public works .....	\$6,000	1 chief accountant .....	\$2,000
1 chief clerk .....	2,400	1 paymaster, assistant accountant .....	1,500
1 stenographer and typewriter, English and Spanish .....	1,500	Total .....	3,500
3 officials for departments of registry, archives, and correspondence, at \$800 each .....	2,400	<b>Section of civil work:</b>	
1 janitor .....	600	1 state architect .....	2,400
1 messenger .....	400	1 contractor, assistant architect .....	1,500
Total .....	13,300	1 draftsman .....	720
		1 typewriter .....	720
		Total .....	5,340

*List of regular employees of the department—Continued.*

## GENERAL MANAGEMENT AND DISTRICT OFFICES.

<b>General management:</b>		<b>District of Matanzas:</b>	
1 general directing engineer .....	\$4,000	1 chief engineer .....	\$2,500
1 assistant engineer .....	2,400	1 chief clerk .....	1,800
1 assistant chief clerk .....	1,600	1 typewriter .....	720
1 second assistant for railroad service ..	1,400	1 messenger .....	360
1 stenographer and typewriter, English and Spanish .....	1,200	<b>Total .....</b>	<b>5,380</b>
1 keeper of records .....	900	<b>District of Santa Clara:</b>	
1 stenographer and typewriter, Spanish ..	900	1 chief engineer .....	2,500
2 typewriters, at \$720 each .....	1,440	1 chief clerk .....	1,800
1 messenger .....	360	1 typewriter .....	720
1 janitor .....	300	1 messenger .....	360
<b>Total .....</b>	<b>14,500</b>	<b>Total .....</b>	<b>5,380</b>
<b>District of Pinar del Rio:</b>		<b>District of Puerto Principe:</b>	
1 chief engineer .....	2,500	1 chief engineer .....	2,500
1 chief clerk .....	1,800	1 chief clerk .....	1,800
1 typewriter .....	720	1 typewriter .....	720
1 messenger .....	360	1 messenger .....	360
<b>Total .....</b>	<b>5,380</b>	<b>Total .....</b>	<b>5,380</b>
<b>District of Habana:</b>		<b>District of Santiago de Cuba:</b>	
1 chief engineer .....	2,500	1 chief engineer .....	2,500
1 chief clerk .....	1,800	1 chief clerk .....	1,800
1 typewriter .....	720	1 typewriter .....	720
1 messenger .....	360	1 messenger .....	360
<b>Total .....</b>	<b>5,380</b>	<b>Total .....</b>	<b>5,380</b>

Besides the aforesaid regular employees there are others to a greater extent employed in the study of and carrying out the works, but the expenses of the latter are charged to the appropriation granted for the same.

This method of exacting a bond, which is employed in conformity with the new regulations, is completely antagonistic to that which was formerly observed. This bond has not only for its purpose the protecting of the department against the faults of its higher employees, but also to awake and develop among said employees their personal effort and cause, them to consider the responsibilities of their positions. For the same purpose this department adopted a system antagonistic to the old Spanish method concerning the appointment of employees. In the former régime the principal heads of sections obligated their subalterns to accept the employees in their respective dependencies that the former chose to name. At the present time the chiefs in charge of work, being responsible for the same, are at liberty to select the employees that they require in conformity with the regulations. The necessary employees for each study or work are appointed and their salaries charged to the appropriation for the same while the work lasts. On the said reorganization being approved the personnel specially employed in inspection of railroads was suppressed, the said duty being performed at the present time by the respective chiefs of provinces, there being no special employees for the purpose.

This department is preparing a plan by virtue of which, within the provisions of the law and in accordance with the concessionary rights of railroads, the inspection of the latter will be reestablished without cost to the state.

The number of employees of the section of civil work was also reduced from what was previously estimated. The said service had always in its charge the reconstruction or repair of all buildings owned by the state. This department employs at the present time the services of an architect and competent builders, for which reason it is in condition to prepare any plans for the construction of state buildings, and I hope that in future all the works, either new or consisting of repairs, may be performed by this department.

This new organization would not have been complete or efficient if we should have continued under the old practices and methods for the preparation and execution of public work. In the Spanish methods there was so much red tape that it seemed they were conceived for the purpose of earning salaries and indemnities for interminable reports of all kinds, and even after a project was definitely approved great difficulties were encountered in regard to obtaining and disbursing the funds necessary for the work.

On assuming charge of this department in January I found a great lack of rules for the government of the different officials in charge of the different branches of the service, prescribing the manner of presenting the reports and rendering accounts, as well as of making the frequent inspections necessary under all good management. Therefore it was necessary to prepare the regulations for the government of the

department of public works. The same, having been approved, went into force on the 1st of July, 1900.

In the preparation of the said regulations those of the United States Army, that of the Engineer Corps of the United States, and the former regulations of public works have been utilized in so far as they were useful to the department by introducing simple methods of organization, accounting, etc., and, while greater liberty of action and of responsible personal effort is given, a bond is likewise exacted and the acts and accounts of employees are carefully inspected for a greater guaranty of the public.

I must give due credit to Maj. Wm. M. Black, of the United States Engineer Corps, for his valuable aid in the preparation of the new regulations, which are contained in Appendix B.

With the purpose of also regulating the technical business of the department another set of regulations has been prepared, entitled Interior Regulations of the Service, in which instructions are given to district engineers and persons in charge of works as to the method of proceeding to make the study or survey of works and prepare the respective projects. These regulations are contained in Appendix F.

#### GENERAL PLAN OF TURNPIKES.

The lamentable condition of the means of communication in the island, which prevents the advance and development of agriculture and commercial interests, and the considerable number of persons who at the commencement of this new period had absolutely no work, has caused that preferred attention be given to the building of roads throughout the island. On placing myself in communication with the provincial and municipal authorities concerning the most pressing necessities of their respective localities, the number of requests for the building of roads was so great that I found myself obliged, in view of the scarcity of funds to undertake the building of all of them at one time, to form a kind of judgment that would serve me as a guide to select those most needed.

It must be observed that the province of Habana was the most favored one under the former Spanish régime, inasmuch as it is the only one having good roads, with the exception of that of Pinar del Rio. The rest of the island is absolutely unprovided for in the matter of roads, those that are ridiculously called such throughout the whole island being nothing more than the trails or clearings open for public traffic. Their base is the natural soil, without bridges, culverts, drains, or proper gradings for traffic; consequently it is impossible to use them in the rainy season.

On determining which turnpike should be first built it seemed at first sight that an equitable distribution be made of the corresponding and necessary appropriations among the sundry provinces, but at the same time the existing conditions in this country prevent the application of the same principle of distribution of credits that in other countries it is customary to make.

At ordinary times and conditions, on classifying and apportioning the roads that are to be built in a country, it is generally customary to take into account the assessed value of the property, the population, the number of miles of roads existing for each 1,000 inhabitants, the population per each mile of road existing, and the total number of the latter; but to apply in this island the basis that I have just mentioned for the distribution of the credits spoken of would be a marked act of injustice toward certain localities that have the most urgent necessity for roads, while others unnecessarily would be benefited where the necessity of building roads is not so great. The principle of assessed value can not be applied on account of the great destruction of all kinds of property that was caused during the last war, especially those that would be most benefited by the construction of public roads. In general, the concentration of population and prosperity or wealth go hand in hand, and neither the one nor the other is in unvarying relation to the importance and cost of a system of public roads. The proportion of existing miles of roads for each 1,000 inhabitants or their proportional subdivision to the population for each mile of existing roads can not be considered as a logical basis for the distribution of credits, neither can the superficial area of each province be taken as a logical basis for such distribution here in the island. It not being possible that all the roads asked for can be built at once, the following question naturally arises, Which road should be built first?

On selecting general routes for the new roads we should try to place them where they will be of the greatest advantage to the greatest number of inhabitants, and therefore I present the following general plan of roads that will merit special attention and the routes of which may be seen on the maps sent herewith:

1. Roads which when built will furnish means of transportation from the interior. There are important towns in the interior that are distant from railroads or waterways, and thus isolated they have few means of advancement. Among others that

are in like condition is the city of Bayamo in its relation with Manzanillo, which is the natural port for its products.

2. There are still in this island great areas of virgin soil in certain districts of the island, above all in the provinces of Santiago de Cuba, Puerto Principe, and Santa Clara, where roads should be built for the purpose of making the said districts accessible. Nothing is produced there at the present time simply because there are no roads offering facilities for transportation of any products that they might have.

3. There should also be attended to those places that so severely felt the effects of war, the inhabitants of which are still prevented from rebuilding their homes and properties. In such districts the building of roads would not only favor the development of the district, but would also furnish its inhabitants with a means of subsistence.

4. It is a lamentable fact that the large centers of population in the island are almost all without good means of communication with the surrounding neighborhood, with which they maintain close business relations, as the large cities are the markets where the small farmers sell their produce. In no part are roads needed more than in the neighborhood of large cities.

5. Not so pressing, but not less important, are the roads built parallel to railroad lines for the purpose of favoring free competition in local traffic.

6. The roads which in the course of time may be built, following the indications of the preceding paragraph, should be so grouped that in the future they will constitute continuous routes through the island, which at the same time as they benefit general and local interests will constitute a source of pleasure to travelers.

There are many other roads that could be laid down on the map, but with those already marked out there the first and most important necessity of the island is provided for, and in the building of which some years will pass. After this first system has been constructed other ramifications thereof may be made for the purpose of opening a greater extent of territory to production and facilitating the means of transportation of the products. On studying the map that contains the general plan of turnpikes, it will be at once noticed that in some places, like the province of Matanzas for example (where hardly any roads have been projected in its center, which fact is due to the greater facilities that the said province has over all the others for transportation by rail), under the present circumstances it has been believed to be more convenient, for reasons of economy, to build roads in preference where there were no means of transportation. However, it will be also observed that in the same province the ulterior object of the road from Matanzas to Canasi is that it be continued as far as Habana, connecting with that from Guanabacoa until reaching La Gallega, which road when finished will constitute a very important factor for the development of that district, not only from its having the road, but from the fact that the latter will force the railroads to reduce their freight rates for local traffic, with the further result that the influence exercised will be indirectly felt much farther away from the route through which it passes. In the same manner the road which at the present time is being studied from Matanzas to Sidra and Santa Ana, by facilitating and cheapening the cost of transportation of sugars to Matanzas by turnpike, will force the railroad to reduce its freight rates.

In the following tables are detailed the turnpikes of the general plan, as are shown on the corresponding map, which plan has been prepared in conformity with the opinion above expressed, and taking into consideration the present economic conditions of the country.

## PROVINCE OF PINAR DEL RIO.

TURNPIKES.	Passing through—	Length.	Approximate cost.	State.
		<i>Kilometers.</i>		
Guanajay to San Cristobal .....	.....	50	.....	Built.
Guanajay to Mariel .....	.....	12	.....	Do.
Cabañas Branch .....	.....	18.3	.....	Do.
Pinar del Rio to La Coloma .....	.....	24.12	.....	Do.
Cabanas to Bahía Honda .....	San Diego de Nueñez.	31	\$185,000	In construction.
Bahía Honda to La Palma .....	.....	48	288,000	Under study.
La Palma to Embarcadero de los Arroyos.	Santa Lucia Baja ...	107	642,000	Projected.
Los Arroyos to Pinar del Rio .....	Mantua, Montezuelo, Guane, San Juan y Martínez y Rio Seco.	108	648,000	Do.
San Juan y Martínez to Punta de Cartas .....	.....	5	30,000	Do.
Pinar del Rio to San Cristobal .....	Los Palacios .....	75	450,000	Do.
Pinar del Rio to Embarcadero de San Cayetano.	Vifiales .....	47	282,000	Do.

## REPORT OF MILITARY GOVERNOR OF CUBA.

## RECAPITULATION.

	Kilometers.	Cost.
Built .....	104.42	.....
In construction .....	31	\$185,000
Under study .....	48	288,000
Projected .....	342	2,052,000

## PROVINCE OF HABANA.

Turnpikes.	Passing through—	Length.	Approximate cost excluding bridges.	State.
		<i>Kilometers.</i>		
Habana to Guanajay .....		42.3		Built.
Punta Brava to Cangrejera .....		3.5		Do.
Habana to Bejucal .....		25.40		Do.
Arroyo Apolo to Managua .....		14.60		Do.
Habana to Guines .....		48		Do.
Cotorro to Santa Maria del Rosario .....		2.5		Do.
Cuatro Caminos to La Canoa .....		3.56		Do.
Habana to La Gallega (first section of road from Habana to Matanzas).		13.4		Do.
El Cano to Guanajay—Guanajay to Cuatro Caminos.	Santiago de las Vegas, Managua, and Canoa.	5		In construction.
		33		Projected.
Managua to Surgidero de Batabano.	Anil, San Antonio de las Vegas, Duran, and Batabano.	35	\$210,000	Under study.
Rincon to Guira de Melena and Alquizar.	San Antonio de los Baños.	30	180,000	Do.
Jamaica to San Antonio de Rio Blanco.	Tapaste and Jaruco.	25	150,000	Projected.
Guines to Santa Ana .....	Pipian .....	40	240,000	Do.
La Gallega to Canasi (second section of road from Habana to Matanzas).		50	300,000	Do.

## ISLE OF PINES.

Santa Fe to Nueva Gerona .....	16	\$96,000	Projected.
Santa Fe to Jucaro .....	8	48,000	Do.

## RECAPITULATION.

	Kilometers.	Cost.
Built .....	153.26	.....
In construction .....	5	\$30,000
Under study .....	65	390,000
Projected .....	172	1,082,000

## PROVINCE OF MATANZAS.

Turnpikes.	Passing through—	Length.	Approximate cost, excluding bridges.	State.
		<i>Kilometers.</i>		
Matanzas to Canasi (first section of road from Matanzas to Habana).		25	\$150,000	In construction.
Matanzas to Santa Ana and La Cidra.		18	108,000	Under study.
Matanzas to Cardenas .....	Camarioca .....	54	324,000	Projected.



## RECAPITULATION.

	Kilo- meters.	Cost.
In construction .....	25	\$150,000
Under study .....	18	108,000
Projected .....	54	324,000

## PROVINCE OF PUERTO PRINCIPE.

Turnpikes.	Passing through—	Length.	Approximate cost, excluding bridges.	State.
		<i>Kilometers.</i>		
Sancti Spiritus to Puerto Principe.....	Ciego de Avila .....	206	\$1,236,000	Projected.
Puerto Principe to Santa Cruz .....	.....	76	456,000	In construction.
Puerto Principe to Tunas .....	Sabanico, Cascorro, and Guaimaro.	136	816,000	Projected.

## RECAPITULATION.

	Kilo- meters.	Cost.
In construction .....	76	\$456,000
Projected .....	342	2,052,000

## PROVINCE OF SANTA CLARA.

Turnpikes.	Passing through—	Length.	Approximate cost.	State.
		<i>Kilometers.</i>		
Trinidad to Casilda .....	.....	5	\$30,000	In construction.
Caunao to Manicaragua.....	.....	50	{ 258,220 22,580 }	Do.
Santa Clara to Caibarien .....	{ Camajuani and Remedios. {	31 60	360,000	Under study.
Palma to Vueltas.....	.....	3	12,000	Projected.
Santa Clara to Placetas.....	.....	50	300,000	Do.
Placetas to Trinidad .....	Guaracabulla, Baez, Fomento, and Jiquiamas.	64	384,000	Under study.
Manicaragua to Sopimpa.....	Guinia de Miranda..	30	180,000	Do.

## RECAPITULATION.

	Kilome- ters.	Cost.
In construction .....	128	\$726,041
Under study .....	154	924,000
Projected .....	53	312,000

## PROVINCE OF SANTIAGO DE CUBA.

Turnpikes.	Passing through—	Length.	Approximate cost excluding bridges.	State.
		<i>Kilometers.</i>		
Santiago de Cuba to Manzanillo ....	San Luis, Palma Soriano, Baire, Jiguani, and Bayamo.	175	\$1,050,000	In construction.
Santiago de Cuba to Holguin .....	San Luis, Cauto Abajo, Los Indios, Canoa, and La Cuaba.	127	762,000	Under study.
Holguin to Gibara.....	Auras.....	33.3	199,800	Do.
Tunas to Puerto Padre .....	.....	47	282,000	Do.
Holguin to Tunas .....	.....	82	492,000	Projected.
Holguin to Jiguani.....	.....	59	354,000	Do.
Guantanamo to Santiago de Cuba.....	.....	81	486,000	Do.
Mayari to Los Indios.....	.....	60	360,000	Do.
Mayari to Sabanilla.....	.....	42	252,000	Do.
Tunas to Bayamo .....	.....	60	360,000	Do.

## RECAPITULATION.

	Kilometers.	Cost.
In construction.....	175	\$1,050,000
Under study.....	207.3	1,243,800
Projected.....	384	2,304,000
Built.....	275	
In construction.....	440	2,597,041
Under study.....	492.3	2,953,800
Projected.....	1,347	8,076,000
Total.....	2,536.3	13,626,841

After all the roads of the general plan have been built there will be in the island 2,536 kilometers of turnpikes, of which 2,280 kilometers will have cost approximately \$13,500,000.

During the Spanish régime the roads were divided into three classes according to the widths of the same.

At the present time, and for the purpose of doing the greatest amount of work possible in view of the scarcity of available funds, I have deemed proper to direct that the building of roads be in accordance with the details and dimensions set forth in Appendix C, regulating the building expenses of the roads in the most economical manner compatible with the efficiency and duration of the same. It is not possible to state with preciseness the cost of building roads, inasmuch as it is different in each locality, according to the amount of earth to be moved, the distance that supplies have to be hauled, prevailing wages, etc., but \$6,000 per kilometer, without including bridges or purchase of lands, may be given as an approximate average.

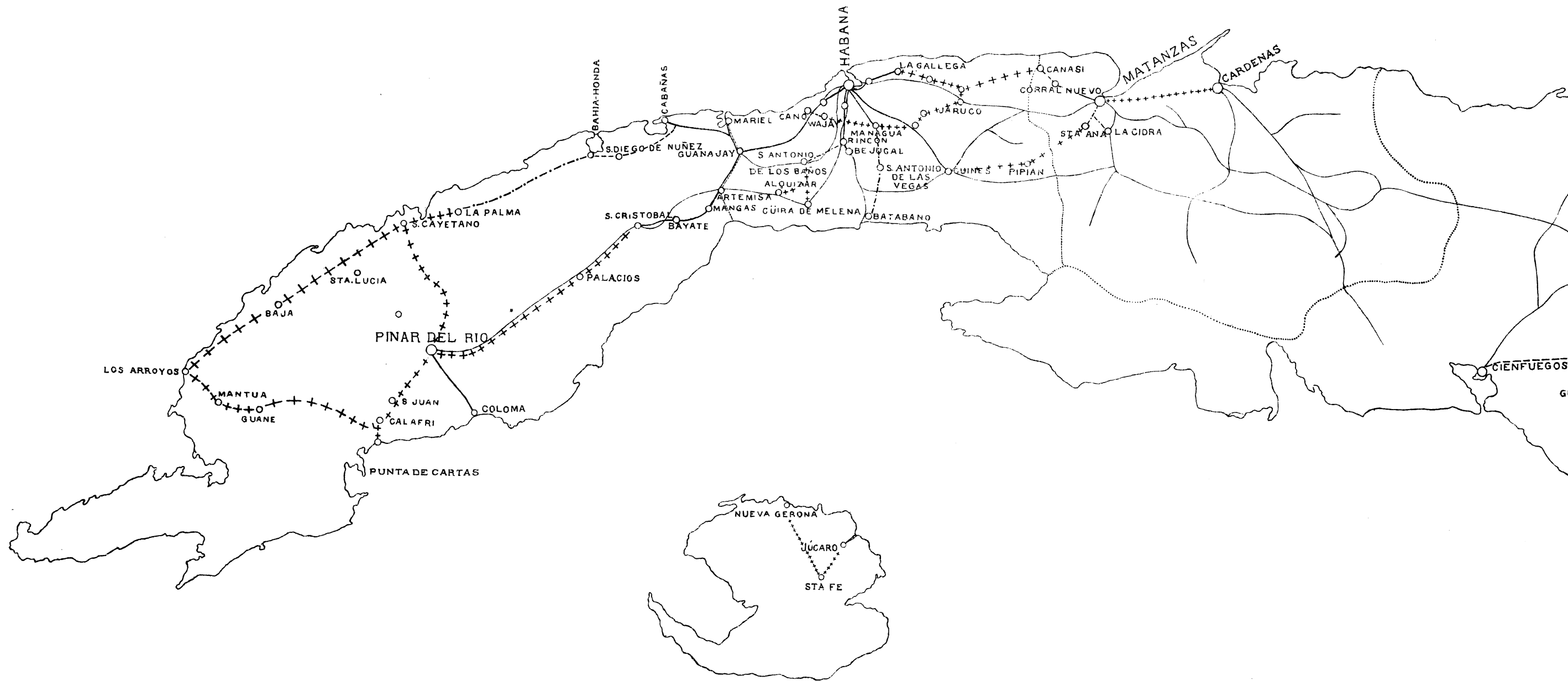
It has been deemed necessary to instruct the engineers in charge of roads that in the preparation and building of the same to avoid the common practice in other countries of crowning them with mud and vegetable earth taken from the side ditches. Such roads, known in English by the name of mud roads, can be built at very little cost, but they would be of no use in this island, but rather, on the contrary, such methods would make worse the condition of the existing roads, as with rains great mud puddles would be formed that would render traffic difficult, if not entirely impossible. The employment of money in the repair of roads in the aforementioned manner is a waste, as the object in view is never attained and the constant necessity of further expenditures exists.

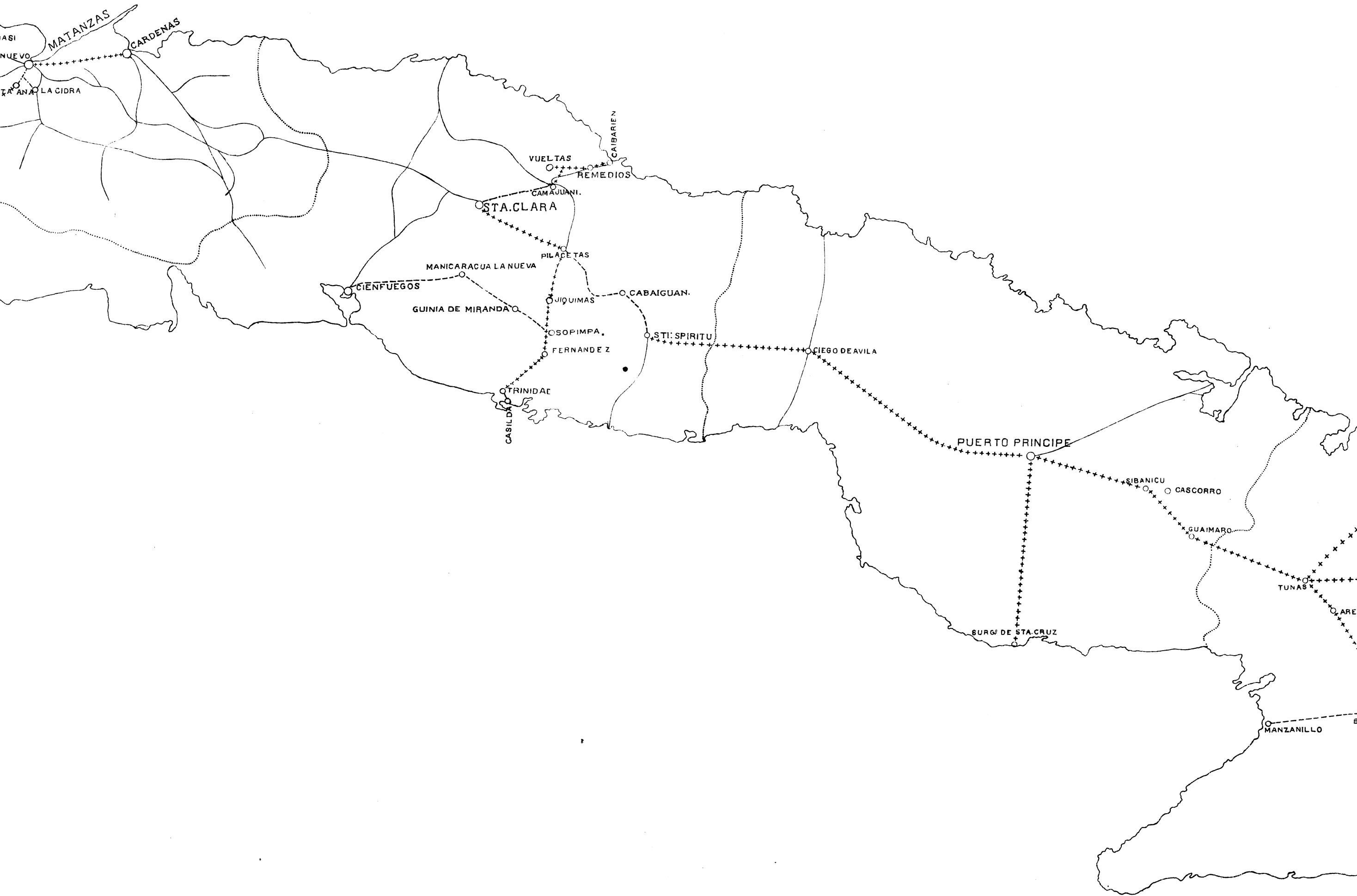
The engineers of districts have also been instructed that all roads must be perfectly macadamized, and whenever the available funds are not sufficient, as at present for the roads from Placetas to Sancti Spiritus and from Caunao to Manicaragua, they have been ordered to attend with preference to the building of bridges and culverts and their approaches for the purpose of making traffic possible at all times of the year. Notwithstanding the said fact, it is my opinion that all repairs to existing roads should be made lasting, with firm bed and sufficient drainage. Money so invested is made good use of, and the course of time will prove that it was real economy.

## MATERIAL EMPLOYED IN ROADBED OF TURNPIKES.

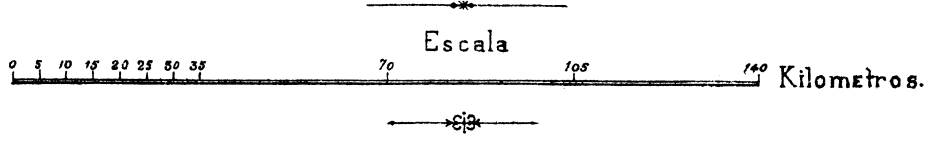
The material employed in the building of roads is generally limestone of different kinds, more or less soft, the coral limestone formation predominating.

A rare coincidence shows that in the neighborhood of Habana, where within a radius of 25 kilometers the traffic is the greatest, all the stone that is found and used is of the softest kind, while beyond the said distance of 25 kilometers the best kinds are found, the traffic being much less at that distance. The best stone to be found in this western part of the island for the building of roads is at kilometer No. 6 of the turnpike from Guanajay to Mariel, at a quarry known by the name of Martin Mesa. The price of this stone delivered on the road as far away as 4 kilometers on each side of the quarry is \$1.50 per cubic meter average, but its use is almost impossible at a greater distance than 8 kilometers in consequence of the high price of hauling and of the fact that other stone is to be had at a less distance, which, although not so good, is still acceptable for the use of the road. Efforts have been made to use this stone in the neighborhood of this city, but it would cost delivered here approximately from \$3.50 to \$4 per cubic meter, which would make the building cost very high. It is a limestone, dark blue, almost black, in color, very like in appearance and structure to trap rock. Its hardness and wearing qualities are great, and it resists pressure of 150 kilograms per cubic centimeter and hardly gives off any dust when subjected to traffic.





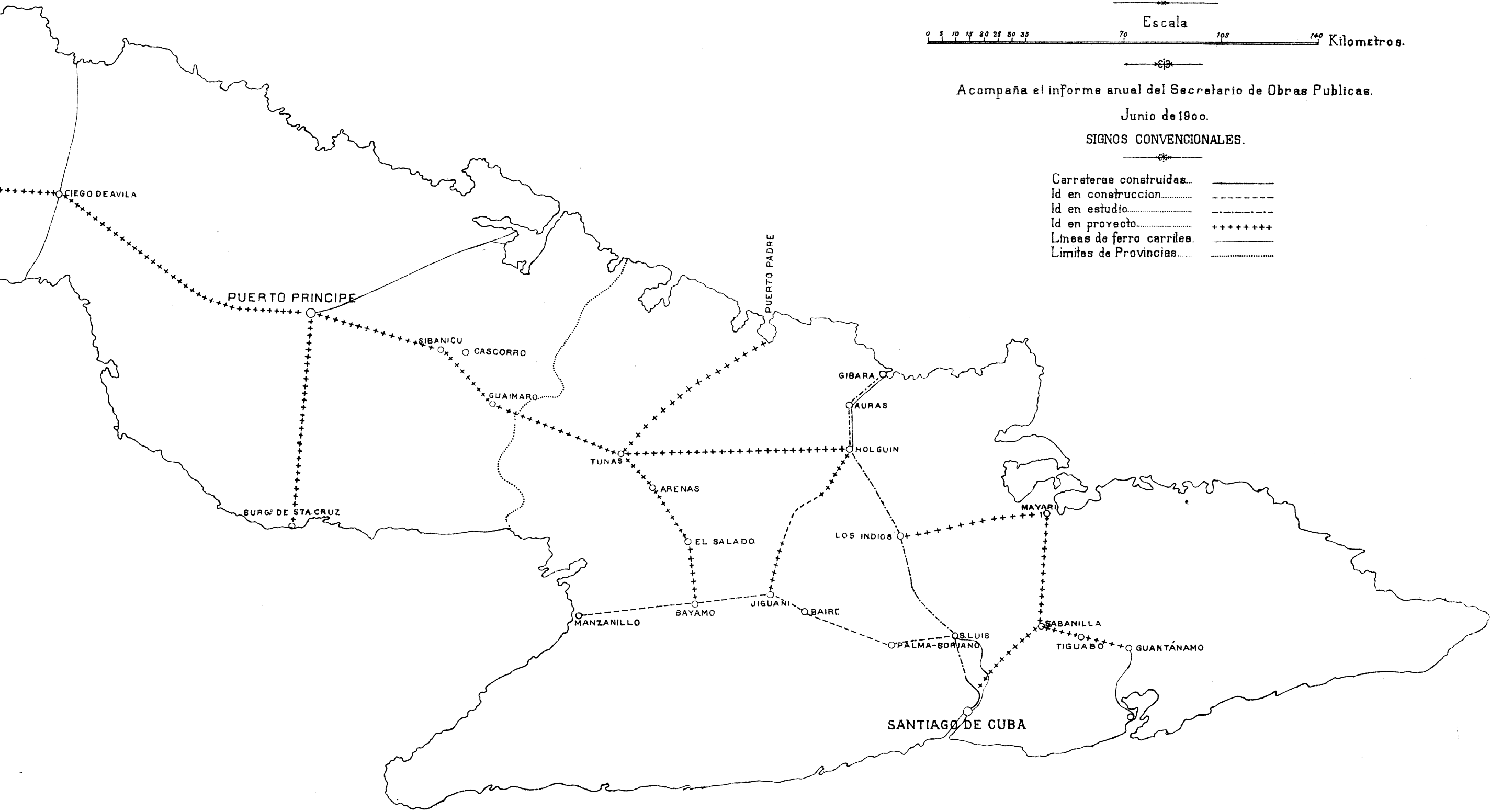
PLANO GENERAL  
DE LAS  
CARRETERAS  
QUE MERECEAN ATENCION PREFERENTE



Acompaña el informe anual del Secretario de Obras Publicas.  
Junio de 1900.

SIGNOS CONVENCIONALES.

- Carreteras construidas.....
- Id en construccion.....
- Id en estudio.....
- Id en proyecto.....
- Lineas de ferro carriles.....
- Limites de Provincias.....





In the eastern part of the island the military officers in charge of the building of roads in the neighborhood of Santiago have used an excellent stone, as good as the stone from Mariel, but it is much more abundant there and is to be found along the roads, which circumstance considerably reduces its cost.

In general the price of stone varies, according to locality, from \$2 to \$2.50, broken up and delivered on the road.

During the last nine months a considerable fall has taken place in the price of stone, and that which was sold at \$3.25 per cubic meter when its supply was monopolized by a few at the present time is being offered in the neighborhood of this city in public competition for \$1.78, broken up and delivered at the place where it is to be used on the road. The said prices are for stone broken by hand, which was the kind used until a short while ago in the island.

## PRICE OF STONE.

In the province of Habana there has been during the year a great variation in the price of stone, as may be seen by the following table showing the places where it has been used:

Repairs from Habana to Bejucal, at kilometers 19 to 25.....	per cubic meter..	\$2.74
At works being done:		
Repairs at kilometers—		
20 and 21, Guines.....	do.....	2.00
25 and 27, Guines.....	do.....	1.79
12 and 20, Managua.....	do.....	2.15
8 and 11, San Cristobal.....	do.....	2.45
3 and 5, San Cristobal.....	do.....	1.80

## COST OF MATERIALS; COST OF UNITIES OF WORK; PROPORTION OF EXPENSES OF ADMINISTRATION.

In this report no detailed and exact statements can be made of tasks, amount, and cost of work done, inasmuch as within the short time that this department has been organized it has not been possible to collect all the particulars desired, and, besides, those which have been collected concerning the works being done at the present time and which were commenced some time ago would have in themselves little value, because it was known that at the commencement of any work and in the meanwhile that the same is not being pushed forward with regularity, the expenses are always greater.

Some of the works that are described in this report were commenced at the beginning of the second half year, but, due to the deficiency in the methods employed in accordance with Spanish régime, exact statistical data of cost per unity of work could not be collected, nor of the amount of work performed per individual. For the purpose of regulating the execution of the work and facilitating statistical data models of daily reports, shown in Appendix D, have recently commenced to be used, from which all the particulars desired may be taken, besides by continually and minutely examining the same a constant inspection of the progress of the works may be had.

In the following table there are expressed approximately the average prices of materials employed in different works and cost of the unities of work done, salaries and wages of employees, and the amount of work that a man can daily perform.

The proportion of expenses of administration to the cost of the work done has been very variable, and while fluctuating in the province of Habana the proportion has been very satisfactory, as may be seen by the annexed table; but in new works it has not been so satisfactory, and it is only mentioned here for the purpose of its serving as a comparison in the coming fiscal year, which will show the economy that has been introduced into the methods of work, whereby said proportion is diminished.

*Price of materials.*—Crude oil, 18 cents per liter, 60 cents per gallon; hemp rope, 65½ cents per kilogram; hemp cord, 97½ cents per kilogram; stakes, 1 by 1½ inches, 2 cents each; stakes, 7 by 3 inches, 32 cents each; paint, 87 cents per kilogram; powder, \$1.52 per kilogram; fuses, 1½ cents per meter; tallow, 13 cents per kilogram; slacked lime, \$2.30 per cubic meter; in Habana, \$3; unslacked lime, \$4.80 per cubic meter; sand, in Habana, \$2; cement, 3 cents per kilogram, 1 cent per pound; broken stone, \$1.20 per cubic meter; by contract, \$2.74 in Habana; average, \$2.41½; large stone, 90 cents per cubic meter; large stone in Habana, \$1.80; yellow-pine lumber, \$26 to \$28 per 1,000 feet, white pine, \$30 per 1,000 feet; axes, \$1.25; machetes, \$1; old rails, 19 cents per kilogram; shovels, 50 cents; blacksmith coal, \$7 per ton; steam coal, \$6.95 to \$7 per ton of 2,000 pounds; domestic bricks, \$16 to \$20 per 1,000.

*Forage.*—American corn, \$1.40 per quintal; oats, \$1.70 per quintal; hay, two half bales, \$2.45.

*Salaries and wages.*—Engineer, \$1,800 per annum; assistant, \$1,000 to \$1,200 per annum; inspector, \$800 to \$1,000 per annum; clerk, \$600 to \$720 per annum; time-

keeper, \$800 per annum; leveler, \$720 per annum; chainmen, \$360, \$480 to \$720 per annum; rodman, \$360 per annum; foremen, \$1 to \$1.50 daily; workmen, 60, 70, 80, 90 cents, \$1, and \$1.20 per day; machinist, \$2.50 and \$3, Habana; firemen, \$1.50; masons, \$1.50 to \$2.25, Habana; blacksmith, \$1.40; carpenter, \$65 monthly; watchman, \$30 monthly; cartmen, \$27 monthly; cartmen, \$36 monthly; cartmen, 90 cents per day.

*Cost of unity of works; performed; new works.*

	Manicragua.	Placetas.	Canasi.
Cleaning of road.....per linear meter.....	\$0.28	\$0.22½	.....
Cleaning of ditches.....do.....	.043	.....	.....
Opening of ditches.....do.....	.28	.....	\$0.12
Excavations:			
Earth.....	.36	.....	.....
Stone.....per cubic meter.....	.64	.....	.....
Stone.....do.....	.82	.....	.72
Broken stone placed on road.....	1.99	.....	{ 1.20
			{ 1.40
			{ .90
Stone for Telford roadbed.....			{ 1.00
Ordinary mason work.....per cubic meter.....	5.67	.....	.....
Dry mason work.....		a 2.60	3.00
Telford.....per square meter.....		.....	.47
Macadam.....do.....		.....	1.52
Rolling and sprinkling.....do.....		.....	.18

a Per cubic meter.

*Cost of unities of work in the preservation of roads, province of Habana.*

Grading of walks and cleaning of ditches.....	\$0.012
	.015
	.016
	.017 s. m.
Opening of ditches.....	.022
	.024
	.027
(a) Collecting stone near the road.....	.031 c. m.
(b) Loading, hauling, and unloading aforesaid stone (varying according to length of haul).....	.021 c. m.
	.012
	.066 c. m.
(a + b) { .33	
(a + b) { .38 c. m. Unbroken stone placed on the road.	.87
(c) Quarrying stone with powder.....	.53 c. m.
(d) Loading, hauling, and unloading said stone under contract, length of haul, 1½ kilometers.....	1.27 c. m.
(e) Breaking of stone by contract.....	.70 c. m.
Breaking of stone by administration.....	.63
	.70 c. m.
(f) Quarry rights.....	.10 c. m.
(c + d + e + f).....	2.60
Repairing holes.....	.05
	.033
	.07½
	.15 s. m.
Cleaning of culverts and taking out dirt.....	.35 c. m.
	.11
Loading, hauling, and unloading earth.....	.14 c. m.
	.22
Spreading of stone.....	.05 s. m.
Sand for covering and spreading of same, \$ .34 l. m.....	
Sprinkling ¾ cents per l. m., 5 meters wide.....	
Rolling by oxen, .21 l. m.....	

*Cost of unity of works in the repair of turnpikes, province of Habana.*

Spreading of stone (5 meters wide).....	\$0.10
	.15 l. m.
	.13
Spreading, covering with materials at hand.....	.012 l. m.
	.04 l. m.
Sand covering, brought from a distance and placed on the work with department carts.....	.22
	.47 c. m.
Purchased and delivered at the work.....	\$2.00
Average cost of stone under contract.....	2.41 c. m.
Opening of ditches.....	.24 c. m.
Wooden fence.....	.43 l. m.
Repair of masonry walls.....	6.38 c. m.
Repair of ordinary masonry pillars.....	7.83
	8.00 c. m.



*Tasks or unities of work by day wages.*

Cleaning of road.....	2.8 to 3½ cents l. m.
Cleaning of ditches.....	$\frac{1.30 \div .50}{2} \times .40$ 8 l. m.
Excavation.....	{earth \$1.25 c. m. .71 stone .97 c. m.
Opening of ditches.....	2.8 l. m.
Grading of walks and cleaning of ditches.....	\$1.00 s. m.
Spreading of broken stone.....	.40 c. m.
Dry mason work.....	.14 c. m.
Quarrying of stone.....	1.50 c. m.
Breaking of stone.....	1.00 c. m.
Filling of holes, 20 s. m. comprising 3 c. m.	

*Proportion of administration expenses to total cost of the work.*

Repair of Bejucal road.....	Ks. 19.25..6, 7%
Repair of Guines road.....	Ks. 25.27..7%
Repair of Guines road.....	Ks. 20.21..6, 5%
Repair of Managua road.....	Ks. 12.20..6, 8%
Repair of San Cristobal road.....	Ks. 8.11..7, %
Preservation of roads.....	6, 8%
Cañao to Manicaragua.....	18%
Placetas to Sancti Spiritus.....	33%

## PRESERVATION OF ROADS.

Of the roads already constructed there are in charge of this department 138 kilometers in the province of Habana and 118 kilometers in that of Pinar del Rio, distributed in the following manner:

Province of Habana:	Kilometers.
From Habana to Guines.....	48
From Luyano, Guanabacoa, and Gallegu.....	14
From Habana to Bejucal.....	26
From Arroyo Apolo to Managua.....	14
From Habana to San Cristobal, first section.....	30
Branch from Cotorro to Santa Maria del Rosario.....	2
Branch from Cuatro Caminos to Canoa.....	4
Total.....	138
Province of Pinar del Rio:	
From Habana to San Cristobal, second and third sections.....	62
From Guanajay to Mariel and Cabanas.....	31
From Pinar del Rio to Coloma.....	25
Total.....	118

The greater part of these roads were built from twenty-five to forty years ago in a very thorough manner, and it is presumed at a great cost, as there do not exist in this department accounts nor reports as to their construction, and being well preserved they are without any doubt as magnificent samples of turnpike as may be found in the world. Inasmuch as the said roads are the only ones that exist and radiate in different directions from Habana, they are subjected to a very heavy traffic of vehicles, which is especially heavy within a radius of 25 kilometers of this city.

The system adopted for the preservation of these roads is that observed by the French, of constant care, allotting to each workman a certain part of the section (3 kilometers) with a foreman for each 15 kilometers and a resident inspector for each 30 kilometers.

In the neighborhood of Habana, where the traffic is so great and where the roads are soon damaged, a road walker is employed for each two kilometers, and perhaps there may be necessity in the future for employing one for each kilometer.

This system when duly organized is universally recognized as being the best and the most economical, and without any doubt it has contributed to the building of thousands of miles of roads that exist in all European countries, and which recently has caused such impetus in road building in some of the States of the Union, such as Massachusetts, New York, and New Jersey.

The Spanish authorities followed this system, and it is thus explained why in general the said roads were preserved in a very satisfactory condition, excepting during the last five or six years, in which appropriations were limited, and also by reason of the war the condition in which they were found last year when the change of government took place was brought about, at which time less than one-half of the roads were in a satisfactory state, and more than fifty kilometers of them needed important repairs, which have already been or are being made.

To properly organize the system and to cause its continued observance it is necessary to have an appropriation and fixed monthly allowances.

During the Spanish régime, prior to 1890, an annual appropriation of \$200,000 was granted for preservation and repairs of the said roads; an amount that later on was reduced to \$150,000, and during the last three years an appropriation of \$100,000 only was granted.

The preservation of the roads should be divided into two headings—"constant preservation," properly speaking, and "repairs." The first consists in keeping the surface of the road in good condition, filling up the holes as soon as they are made, cleaning and weeding the ditches that the drainage may be good, replanting trees in the places of those that may have died, and seeing that the police law for such roads is complied with.

For the expenses alone of preservation, without counting repairs, there has recently been approved a fixed appropriation of \$7,300 monthly—\$4,300 for Habana, at the rate of \$31.13 per kilometer, and \$3,000 for Pinar del Rio, at the rate of \$25 per kilometer.

Whenever the continuous traffic may have considerably worn-out the surface of the roads, to the extent that the work of preservation is insufficient and a new layer of stone has to be spread, or whenever through any accident important repairs may have to be made to the roads, bridges, culverts, buildings, etc., then it will be necessary to undertake them, for which purpose further appropriations will be asked for, subject to the approval of the plans and estimates in connection therewith. The following table shows the personnel directly in charge of the preservation of roads:

Province of Habana:		Province of Habana—Continued.	
1 assistant engineer .....	\$150. 00	175 cubic meters stone, at \$2.50 .....	\$437. 50
1 assistant .....	125. 00	Tools, utensils, and horseshoeing....	100. 02
1 accountant .....	100. 00		
1 purchasing agent.....	83. 33	Total .....	4, 300. 00
1 clerk .....	60. 00		
1 chief storekeeper .....	60. 00	Province of Pinar del Rio:	
1 blacksmith .....	80. 00	1 auxiliary engineer .....	150. 00
1 blacksmith's helper .....	40. 00	1 clerk .....	60. 00
1 carpenter .....	65. 00	4 section inspectors.....	333. 33
2 stablemen .....	36. 00	8 foremen .....	336. 00
2 cartmen, at \$36 each.....	72. 00	40 road walkers.....	1, 440. 00
1 porter .....	25. 00	6 cartmen .....	180. 00
5 inspectors, at \$83.33 each .....	416. 65	8 rations for mules and shoeing....	100. 00
4 foremen, at \$45 each .....	180. 00	Tools .....	60. 00
47 road walkers, at \$36 each .....	1, 692. 00	100 cubic meters stone for filling holes	250. 00
1 person in charge "dique" property.	30. 00	1 storekeeper .....	45. 00
10 cartmen, at \$30 each .....	300. 00	Incidental expenses.....	45. 67
23 forage rations for mules, at \$9 ....	207. 00		
3 forage rations for horses, at \$13.50..	40. 50	Total .....	3, 000. 00

The cost of the preservation of the roads per kilometer will perhaps appear to be somewhat high, but the special conditions of the material used and of the traffic are the principal causes of the heavy cost. In the first place, the stone which is employed in the roads is a limestone relatively soft, which is easily worn with the continuous traffic of very heavy carts. It is the purpose of this department to always employ the best material, although the cost may be greater, on condition that the circumstances so justify, in preference to the inferior kind, although the latter may be cheaper in price, taking into consideration that in the long run a considerable saving is made.

The other reason, and the most important one for the wearing out of the roads and the consequent expense of their preservation, is the narrowness of the wheel tires in the vehicles used for transportation and the enormous weight they carry. The immense majority, in fact almost all the carrying carts of the island, are two-wheeled ones, the tires of which are approximately  $2\frac{1}{2}$  inches wide, which should be completely flat, but through use and negligence of replacing them they have become worn in such a manner that almost all of them have nearly a semicircular form, whereby the part of the tire that is in contact with the ground is generally only the third part of the total width of the tire; the carts have no springs and carry on an average 2 to  $2\frac{3}{4}$  tons, some of them as much as  $4\frac{1}{2}$  and 5 tons. The gravitation of such an enormous weight upon two points of limited contact, as well as the rigidity of the cart, cause the point of contact of one of the wheels to serve as a pivot when the cart turns, and besides the lack of springs is one of the principal causes of the rapid wearing out of our roads.

For the purpose of remedying this evil I have had the honor to submit for superior approval the draft of the law contained in Appendix E, in which the width of the wheel tires is regulated in proportion to the weight gravitating upon them, including the weight of the cart, and containing rules for the application and observance of said law.

In the meanwhile that the said law is not applied it is useless to think of preserving the roads in good condition at a less cost than the present one, and it is not just

that the Government should expend the money of the public treasury in preserving the roads and continue to permit that one portion of the public unduly persist in destroying with its vehicles the improvements made by the State on the said roads. It is therefore necessary to protect and preserve by means of a law that which for the benefit of the public is made with public funds.

#### SECTION HOUSES.

The above-mentioned plan of preservation of roads comprises the building of section houses to be used as dwellings for the employees and for the deposit of supplies used for the preservation of the roads. For this purpose there were houses and yards throughout the entire length of the road—one at each sixth kilometer, where two road walkers lived, one for each of the three kilometers on one and the other side of the house. In the yards there are stables and space for carts and machinery, and in the house one of its rooms is used for the storage of tools. When foremen or inspectors live in these houses they have special rooms for themselves. During the last war twenty-five of these houses were destroyed, and the lack thereof obliges the employees in charge of sections to be uncomfortably housed in tents or palm huts without there being any place for tools, carts, animals, etc. During the past year some were repaired and others rebuilt, and it is the purpose of the undersigned to rebuild during the coming year all the other section houses that are lacking according to the plan herewith sent, and which is adjudged to be the most convenient from an economical point of view and the requirements of the service.

(Plans and estimates of section houses are sent herewith.)

#### RAILROAD LINES ON THE ROADS.

The convenience and usefulness that electric railroads are, both to the large cities as well as to the suburban and rural wards of the same, are well known to everybody. It relieves the first named from being overcrowded by furnishing rapid transit to the rural wards, the lands of which in consequence increase in value, the said lines being important factors of production and development of wealth, both for the benefit of their builders as well as for that of land owners near to the line, for which reason the latter give their lands gratis for the purpose of having electric railways pass through them.

In the judgment of this department our turnpikes should be reserved for the free use of private conveyances, and both the roads and the owners of private vehicles should be protected against all danger of obstruction against all that which threatens the security and comfort of those having to use the roads, as otherwise the purposes for which they were built would be forgotten.

Our roads are not sufficiently wide to allow the building of electric railroads on them, even if only one side is used. On any road where there is an electric line there is the constant fear of the fright of horses, this constituting especially a serious danger for women and children; besides, the rest of the road not occupied by the railroad not being sufficiently ample for the traffic of loaded vehicles some of the latter are forced to continually keep on a given line of traffic, which rapidly destroys the road-bed and others are forced to follow the railroad line itself, which is an obstruction to the rapidity of the electric cars—one of their principal aims. All vehicles using the roads should have the same rights and such as require special rights in preference to the others should not be permitted to use the roads; and the electric roads from the speed of their cars demand special privileges which are detrimental to other means of conveyance of slower motion.

At the same time the traffic of vehicles in close proximity to the electric road, as well as where they enter and leave the same, causes great damage to the bed of the road, which requires continual and costly repairs. It is well known that upon granting to a company the right of building an electric road through a public road the said company ends by practically appropriating it completely. On the other hand, why should the State grant special favors to electrical companies in preference to those employing steam or any others? Why should an electrical company be granted the free use of that which costs so much money and care to the State?

Electric lines being of so great an advantage to those whose lands they traverse, it frequently happens that the lands are ceded gratis, with the sole condition that the line be built. It is in the interest of the electric companies themselves on building their lines to select the routes of the greatest amount of traffic and by building them in lands of their own outside of the public roads their cars may be run at any velocity that may suit, while on the turnpikes the velocity would be less.

In many places in the United States where roads have been ceded to electric trac-

tion companies the due results have been felt, and a reaction has set in against their using the remaining public roads.

As a result of the foregoing statement, and for the purpose of protecting the existing roads and those which may be built in future against the evils that the building of railroad lines thereon would produce, the use of the roads has been prohibited to the electric traction companies or any other kind, with the exception of the parts thereof which are already being used, and in case of the latter obtaining permits to build their lines they must obtain lands for the purpose away from the roads.

#### PUBLIC BUILDINGS.

Little work has been done by this section during the year, it being principally limited to the examination of reports, securing of information, and preparations of projects for work, some of which latter could not afterwards be carried out. The work carried out has been of little importance, excepting the repairs to the treasury building, estimated at \$40,000, but in consequence of the prevailing financial condition throughout the country at the time that the credit was granted, only during the first three months an insignificant sum was expended, as to June 30 the amount spent only reached \$3,953.47.

At the public works building at Cerro repair was commenced, the sum of \$977.34 having been expended in the month of June. Various projects have been studied for repairs to public buildings, but the execution of the same is provisionally suspended by the superior authorities, in whose judgment this department concurs, to the effect that for the present only such repairs as are necessary for the preservation of the building should be carried out. There are many government buildings of sundry kinds in the city that require considerable expensive repairs, but this department is of the opinion that instead of making all these partial repairs that demand a large expenditure of money, for the sole purpose of preserving in a measure structures of little practical use to the government although of great commercial value, the government should get rid of said properties and invest the funds arising from their sale in modern buildings that will satisfy all the requirements of their purposes and of art. And in this matter I wish to make some remarks concerning public buildings that may require to be built in future. The generality of those already built are absolutely without any architectural style, modern improvements, interior sanitation, and both the materials and methods employed in their construction are of the worst kind. It is not, therefore, strange that the great majority of buildings are not only without any style, but also that there is to be observed a culpable negligence in the choice of materials used.

Public buildings should be models in every respect, for the purpose of stimulating imitation in private works, awakening a spirit of emulation that would bring about as a practical result the gradual improvement in the quality of the work of the artisan, and a greater abundance of the same. Although public buildings might cost something more in their building by the introduction of all modern improvements and methods, I am of the opinion that the investment would be a profitable one, because such buildings must of necessity serve in future as models, and will constitute an object lesson for the Cuban people.

Of the styles best adapted to the necessities of Cuba the classic ones, with their variations, are undoubtedly the best—in the first place, because they are easily adapted to the practical conditions that the architect must encounter; in the second, because it is the unanimous opinion of the best authorities in architectural art that the latter finds in the classical styles its most noble expression, and that they are more in harmony than any other with the sentiments and traditions of the Latin race.

Fine buildings not only serve to make the community having them feel proud, but they also furnish an indirect public income. Wherever architecture is good, commerce is prosperous. In reality many cities of Europe live to-day upon the money spent by tourists who are attracted to them by the beauty of their buildings.

Some time will certainly have to pass before any work can be made in Cuba of sufficient magnitude to attract foreigners by itself alone, but at the same time that work is being done on these lines the people find honest employment and money is put into circulation, whereby as a natural consequence the moral and material conditions of the country are bettered.

#### PREPARATION OF THE TOPOGRAPHICAL AND GEOLOGICAL MAP OF THE ISLAND.

Nothing has yet been done by this department in this matter, as the short time that it has been in existence has been employed, as may be seen by the preceding pages, first, in bringing about a complete reorganization, and second, in commencing works

of most pressing necessity. The making of a topographical map of the island will be of great utility, and it is our purpose to commence it as soon as our more pressing duties will allow.

The uneven surface of the land in certain districts, the abundant tropical vegetation of the island, as well as the season of the year in which the studies would have to be made, render it difficult to foresee with preciseness the cost and time necessary to finish the work.

There does not exist a single topographical map of the island on the exactness of which any reliance can be had. The two which we are acquainted with that contain the greatest amount of information are those of Pichardo and the one published by the staff organization of the United States Army, but neither of them can be considered as exact topographical maps. Less is known in the island of any geological map showing the geological formation and the distribution of its mineral wealth. Unimportant sketches alone have been made in the eastern part of the island by foreign companies engaged in the mining of iron, copper, and manganese.

The making of a topographical map of the island should begin with the establishment of a previous triangulation extending longitudinally throughout the whole island.

The cost of the said study very much depends upon the size of the scale used. Although a scale of 1 in 10,000 would be generally sufficient at the present time, notwithstanding, if the public resources would so allow, I would recommend the use of a scale of 1 in 100,000.

Taking into consideration the urgent necessity that exists of having an exact knowledge of the physical condition of our island, I am of the opinion that instead of utilizing a limited number of sectional studies for a long time, we should utilize a greater number of the same for a shorter period; the cost would be approximately the same; an organization composed of 12 sections of study could finish the previous triangulation within one year, on the scale of 1 in 10,000, making the map on the scale of 1 in 250,000.

From personal knowledge and experience of this country I judge that the topographical studies may be made with the following organization and cost:

1 topographer, chief of section.....	\$3,000
3 assistant topographers, at \$2,400 each .....	7,200
2 men, at \$50 per month .....	1,200
8 workmen, at \$30 per month.....	2,880
1 cook, at \$20 per month .....	240
15 persons, with subsistence, at \$15 monthly.....	2,700
Miscellaneous, incidental, and transportation expenses.....	2,000
	<hr/>
	19,220
Multiplied by number of sections of studies .....	12
	<hr/>
Total.....	230,640
1 chief engineer .....	\$4,000
1 paymaster.....	1,800
2 draftsmen, at \$1,800 .....	3,600
1 office clerk .....	1,500
1 porter .....	360
Traveling expenses of the men coming from and returning to the United States.....	2,500
	<hr/>
	13,760
	<hr/>
	244,400
Instruments and drawing materials .....	20,000
	<hr/>
Total.....	264,400

As to the geological study, I judge that it may be done approximately at the rate of \$1.50 per square mile, making a total of \$67,500, which, added to the former sum, gives a general total of \$331,900.

Should it not be possible to invest or pay out all this money in one year the organization may be carried out, leaving four sections to finish the work in three years, with the natural annual reduction in the cost.

#### KEEPING OF ACCOUNTS.

The two following tables show the expenditures of the department during the fiscal year that this report embraces. The first shows by districts and under different headings the expenditures of each one for employees, materials, etc., as well as for work done, while the second shows collectively, without considering the districts, the classification of surveys, works, and repairs which were attended to in the island during the period to which this report refers. As may be seen by the total of both tables the expenditures amounted to \$422,972.69, of which those for employees and other office expenses, including inspections, etc., reach \$68,621.31, and the balance,

REPORT OF MILITARY GOVERNOR OF CUBA.

that is, \$354,351.38, constitutes the cost of studies, work, and repairs carried out; wherefrom it appears that taking everything into consideration in the department there has been an average proportion of 18.5 per cent of the expenditures for employees, management, and office to the expense of construction. Although the said proportion is not considered entirely satisfactory, it is nevertheless mentioned for the purpose of its serving as a comparison of the proportionate expenses for the same reasons in the coming year.

## DEPARTMENT OF PUBLIC WORKS—SECTION OF ACCOUNTS.

*Recapitulation, by departments, of the expenditures of the department of public works during the fiscal year 1899-1900.*

CENTRAL OFFICE.

Secretary's office and general management:	
Personnel .....	\$13,291.52
Supplies .....	544.76
Installation .....	1,207.73
Inspection of public works:	
Personnel .....	5,094.13
Supplies .....	118.85
Inspection of railroads:	
Personnel .....	3,423.38
Supplies .....	89.35
Official visits .....	10.00
Installation .....	156.55
Section of public buildings:	
Personnel .....	4,034.40
Supplies .....	168.47
Installation .....	237.45
Incidental expenses .....	780.00
Payments for professional service .....	734.75
Study of works .....	2,108.04
Country roads .....	5,712.25
Repair to state buildings .....	2,425.05
Repair to treasury building .....	3,928.17
Repair to school of painting .....	628.97
Study for dredging the port of Cardenas.....	2,998.46
Purchase of steam roller .....	3,500.00
Preservation and repair of turnpikes .....	14,265.50
Road from Placetas to Sancti Spiritus .....	1,788.27
Road from Caunao to Manicaragua .....	9,868.66
Road from Matanzas to Canasi .....	14,954.85

## PINAR DEL RIO.

Principal office of public works:	
Personnel .....	1,758.00
Supplies .....	98.20
Office installation .....	650.00
Rental of buildings .....	218.00
Study of works .....	1,658.58
Preservation and repair of turnpikes ..	14,843.91
Preservation and repair of bridges ..	21,540.69

HABANA.

<b>Principal office of public works:</b>	
Personnel .....	13, 122. 20
Supplies .....	329. 55
Installation of offices .....	150. 00
Studies of works .....	2, 469. 59
Repairs to state buildings .....	5, 677. 63
Preservation and repair of turnpikes .....	38, 887. 37
Repair to road from Habana to San Cristobal, first section, \$18,487.96; second section, \$6,712.48, third section, \$5,978.17 .....	31, 178. 61
Road from Pinar del Rio to Coloma .....	4, 057. 16
Road from Guanajay to Mariel .....	2, 825. 82
Road from Guanajay to Cabañas .....	1, 684. 25
Road from Batabano to the port .....	3, 000. 00
Road from Habana to Bejucal .....	33, 795. 48
Road from Arroyo Apolo to Managua .....	14, 507. 00
Road from Habana to Guines:	
First section .....	7, 203. 63
Second section .....	14, 179. 85

## HABANA—continued.

Road from Luyano to La Gallega .....	\$8,186.51
Road from Punta Brava to Cangrejas.	2,600.00
Studies of road from Managua to Ba- tabano .....	1,688.17
Studies of road from San Antonio de los Baños to Guira de Meleua and Alquizar.....	781.42

**MATANZAS.**

Principal office of public works:	
Personnel .....	6, 137. 87
Supplies .....	244. 08
Installation of office .....	314. 41
Rentals of buildings .....	207. 83
Country roads .....	310. 54
Study for dredging port of Cardenas .....	6, 171. 57
Staking said port .....	2, 888. 33
Studies of works .....	2, 422. 23
Study of survey of roads from Matanzas to Cidra .....	1, 445. 75
Repair of road from Matanzas to Canasi .....	23, 541. 64

SANTA CLARA.

Principal office of public works:	
Personnel	1, 971.33
Supplies	124.47
Installation of office	655.00
Rental of buildings	109.00
Study of works	2, 060.88
Official visits	9.77
Inspection of railroads	3.26
Building of bridge over Damuji River at Rodas	11, 303.49
Road from Caunao to Manicaragua	23, 684.21
Road from Placetas to Sancti Spiritus.	7, 678.64

PUERTO PRINCIPE.

Principal office of public works:	
Personnel .....	3, 000. 00
Supplies .....	925. 85
Rental of buildings .....	200. 00
Pay for professional services .....	179. 00
Study of works .....	744. 96
Inspection of railroads .....	10. 00

SANTIAGO DE CUBA.

Principal office of public works:	
Personnel .....	3, 149. 95
Supplies .....	180. 00
Installation of office .....	648. 29
Rental of buildings .....	80. 00
Studies of works .....	1, 271. 65
Purchase of instruments .....	515. 17
Employees of wharfs and preservation of same .....	188. 13
Repair of Caimanera wharf at Guan- tanamo .....	1, 983. 70
Payment for professional services .....	70. 00

### RECAPITULATION.

Central office.....	\$92,070.16
Pinar del Rio.....	40,767.38
Habana.....	186,724.24
Matanzas.....	43,684.25
Santa Clara.....	47,595.05

Puerto Principe .....	\$5,063.82
Santiago de Cuba.....	8,067.79
<b>Total .....</b>	<b>422,972.69</b>

HABANA, June 30, 1900.

*Recapitulation, by departments, of the expenditures of the branch of public works during the fiscal year 1899-1900.*

## CENTRAL OFFICE.

Secretary's and director-general's offices:	
Personnel .....	\$13,291.52
Supplies .....	544.76
Installation expenses .....	1,207.73
Inspection of public works:	
Personnel .....	5,094.13
Supplies .....	118.85
Inspection of railroads:	
Personnel .....	3,423.38
Supplies .....	89.35
Official visits .....	10.60
Installation .....	156.55
Section of public buildings:	
Personnel .....	4,034.40
Supplies .....	168.47
Installation .....	237.45
Incidental expenses .....	780.00
Payments for professional service .....	734.75
Wharf studies .....	2,108.04
Country roads .....	5,712.25
Repair to government buildings .....	2,425.05
Repair of treasury building .....	3,928.17
Repair of school of painting .....	628.97
Study of dredging port of Cardenas .....	2,998.46
Purchase of steam roller .....	3,500.00
Care and repair of roads .....	14,265.50
Road from Placetas to Sancti Spiritus .....	1,788.27
Road from Caunao to Hoyo de Manicaragua .....	9,668.66
Road from Matanzas to Canasi .....	14,954.85

## PINAR DEL RIO.

Office public works:	
Personnel .....	1,758.00
Supplies .....	98.20
Installation of office .....	650.00
Rental of buildings .....	218.00
Studies of works .....	1,658.58
Care and repair of turnpikes .....	14,843.91
Care and repair of bridges .....	21,540.69

## HABANA.

Chief office of public works:	
Personnel .....	13,122.20
Supplies .....	329.55
Installations of offices .....	150.00
Studies of works .....	2,469.59
Repairs to government buildings .....	5,577.63
Care and repair of turnpikes .....	38,887.37
Repair of road from Habana to San Cristobal, first section, \$18,487.96; second section, \$6,712.48; third section, \$5,978.17 .....	31,178.61
Turnpike from Pinar del Rio to Coloma .....	4,057.16
Turnpike from Guanajay to Mariel .....	2,325.82
Turnpike from Guanajay to Cabanas .....	1,684.25
Road from Batabano to the port .....	3,000.00
Road from Habana to Bejucal .....	33,795.48
Road from Arroyo Apolo to Managua .....	14,507.00
Road from Habana to Guines, first section .....	7,203.63

## HABANA—continued.

Road from Habana to Guines, second section .....	\$14,179.85
Road from Luyano to Gallega .....	8,186.51
Road from Punta Brava to Cangrejas .....	2,600.00
Study of road from Managua to Batabano .....	1,688.17
Study of road from San Antonio de los Baños to Guira de Melena and Alquízar .....	781.42

## MATANZAS.

Chief office of public works:	
Personnel .....	6,137.87
Supplies .....	244.08
Installation of office .....	314.41
Rental of buildings .....	207.83
Country roads .....	310.54
Study of dredging port of Cardenas .....	6,171.57
Staking said port .....	2,888.33
Studies of works .....	2,422.23
Study of road from Matanzas to Cidra .....	1,445.75
Repair of road from Matanzas to Canasi .....	23,541.64

## SANTA CLARA.

Chief office of public works:	
Personnel .....	1,971.33
Supplies .....	124.47
Installation of office .....	650.00
Rental of buildings .....	109.00
Studies of works .....	2,060.88
Official visits .....	9.77
Inspection of railroads .....	3.26
Building of bridge over Damuji River at Rodas .....	11,303.49
Road from Caunao to Manicaragua .....	23,684.21
Road from Placetas to Sancti Spiritus .....	7,678.64

## PUERTO PRINCIPE.

Chief office of public works:	
Personnel .....	3,000.00
Supplies .....	925.86
Rental of buildings .....	200.00
Payment for professional services .....	179.00
Studies of works .....	744.96
Inspection of railroads .....	10.00

## SANTIAGO DE CUBA.

Chief office of public works:	
Personnel .....	3,149.95
Supplies .....	160.00
Installation of office .....	649.29
Rental of buildings .....	80.00
Studies of works .....	1,271.55
Purchase of instruments .....	515.17
Care and personnel of wharves .....	188.13
Repair of Caimanera wharf at Guantánamo .....	1,983.70
Payments for professional services .....	70.00

## RECAPITULATION.

Central office .....	\$92,070.16
Pinar del Rio .....	40,767.38
Habana .....	185,724.24
Matanzas .....	43,684.25
Santa Clara .....	47,595.05
Puerto Principe .....	5,063.82
Santiago de Cuba .....	8,067.79
Total .....	422,972.69

Table showing the amounts expended by this department during the fiscal year of 1899-1900.

CENTRAL OFFICE.		Studies:	
Personnel:		General studies of works .....	\$12,735.83
Secretary's office and general management.....	\$13,291.52	Dredging the port of Cardenas.....	9,170.03
Inspection of public works .....	5,094.13	Road from Managua to Batabano..	1,688.17
Inspection of railroads.....	3,423.38	Road from Matanzas to Cidra.....	1,445.75
Section of public buildings .....	4,034.40	Road from San Antonio de los Baños to Guira de Melena and Alquizar.....	781.42
Supplies:		Country roads .....	6,022.79
Secretary's office and general management.....	544.76	Works:	
Inspection of public works.....	118.85	Preservation and repair of turn-pikes .....	6,796.78
Inspection of railroads.....	89.35	Building and repair of bridges.....	21,540.69
Section of public buildings .....	168.47	Staking of port of Cardenas.....	2,888.33
Installations:		Bridge over Damuji River at Rodas ..	11,303.49
Secretary's office and general management.....	1,207.73	Road from Cuanao to Manica ragua ..	33,552.87
Inspection of railroads.....	156.55	Road from Matanzas to Canasi.....	38,496.49
Inspection of public buildings.....	237.45	Road from Placetas to Sancti Spiritus .....	9,466.91
Indemnities:		Road from Batabano to Port .....	3,000.00
Professional services .....	734.75	Repairs:	
Incidental expenses.....	780.00	State buildings .....	8,002.68
Official visits .....	10.60	Treasury building.....	3,928.17
Purchase of steam roller .....	3,500.00	Road from Habana to San Cristobal, second and third sections .....	12,690.65
Employees:		Road from Habana to San Cristobal, first section .....	18,487.96
Provincial offices, regional and provincial .....	29,143.35	Road from Habana to Bejucal .....	33,795.48
Supplies:		Road from Arroyo Apolo to Managua.....	14,507.00
Regional and provincial .....	1,882.16	Road from Habana to Guines, first section .....	7,203.63
Installation of offices:		Road from Habana to Guines, second section .....	14,179.85
Principal provincial offices.....	2,413.70	Road from Luyano to La Gallega.....	8,186.51
Rentals of buildings .....	814.83	Road from Punta Brava to Cangrejeras.....	2,600.00
Indemnities:		Caimanera wharf at Guantanamo.....	1,983.70
Professional services .....	249.00	Road from Pinar del Rio to Coloma.....	4,057.16
Expenses for inspection of railroads ..	13.26	Road from Guanajay to Mariel.....	2,325.82
Incidental expenses and official visits .....	9.77	Road from Guanajay to Cabañas .....	1,684.25
Purchase of instruments .....	515.17	School of painting .....	628.97
Wharfs: Personnel and care.....	188.13		
Total .....	68,621.31	Total .....	354,35.381

#### RECAPITULATION.

Amount of expenditures for office personnel.....	\$68,621.31
Cost of studies of works and repairs .....	354,351.38
	422,972.67

In the estimate given below for the year ending on the 30th of June, 1901 only fixed expenses have been entered, as the other expenditures depend upon the works that may be in construction. The following table shows the fixed expenses under headings and by districts, including the central office:

*Estimate of fixed monthly expenses of the department of public works of the island of Cuba for the fiscal year of 1900-1901, (approved by the military governor).*

	Personnel.	Office supplies.	Rent.	General studies.	Preservation of roads.	Total.
Secretary's office.....	\$1,108.33	\$75.00				\$1,183.33
Section of public buildings .....	445.00			\$500.00		945.00
Section of accounts .....	291.66					291.66
General management .....	1,208.33	50.00		500.00		1,758.33
District of—						
Pinar del Rio .....	448.33	25.00	\$60.00	1,000.00	\$3,000.00	4,533.33
Habana .....	448.33	25.00		1,000.00	4,300.00	5,773.33
Matanzas .....	448.33	25.00	30.00	1,500.00		2,003.33
Santa Clara .....	448.33	25.00	30.00	2,000.00		2,503.33
Puerto Principe.....	448.33	25.00	40.00	1,500.00		2,013.33
Santiago de Cuba.....	448.33	25.00	40.00	2,000.00		2,513.33
Total.....	5,743.30	275.00	200.00	10,000.00	7,300.00	23,518.30

Total for the year, \$282,219.60.



## RAILROADS.—GENERAL REVIEW.

In this report only a description of the railroad system of the island is given and mention made of some important matters and decisions of this office relating to railroads. This department will later on present a special report concerning railroads, in which important problems will be dealt with in detail.

According to the general railroad law still in force, the railroads in the island of Cuba are divided into three classes—of general service, of special and public service, and of special and private service. The first are those comprised in the railroad plan, or without being so from their concessionary rights having been granted prior to the formation of said plan, are operated in the general service of transportation of passengers and merchandise under duly approved tariff. The said railroads are the only ones which, according to law and by virtue of their being works of public utility, have the right to exercise forcible expropriation in connection with private properties and to the occupation of the public domain and of properties belonging to the state.

Those operated for a special purpose and for public use are those which have been granted to a private individual or company for private use, and at the same time perform public service by the transportation of passengers and merchandise. These latter roads may occupy lands belonging to the public domain, but not under the ownership of the state, nor have they the right to exercise that of forcible expropriation from their not being works of general utility. They may, nevertheless, in special cases, on condition of obtaining a decision as to their being works of public utility, obtain the two last-mentioned privileges.

Many railroads of general public service are in existence since prior to December, 1858, and the date of the first law of general character that was in force in the island in railroad matters, and as a consequence of the lack or absence of a normal basis for the granting of concessions, it appears that in the latter, in some instances, there are prescribed certain rights and obligations that are excluded in others, specifying or not the duration of the concession, fixing or not the tariffs, etc., which has always given rise to sundry questions as to the duties and rights of the said railroads, the companies at times standing firm upon what is contained in their respective concessions.

Nevertheless, the judgment has prevailed always that in all matters referring to the police and public safety, or upon those based upon the guardianship that the state holds over public interests, the provisions of the said decree of 1858, and of the laws and rulings of general character that may have been promulgated thereafter, are applicable.

The interpretation that was generally given to the royal decree of December 10, 1858, and to the general railroad law of November 23, 1877, in so far as they relate to petitions and grants of railroads in the general public service, hindered their development, inasmuch as it made the projects costly and the procedure difficult.

The royal decree of the 25th of September, 1888, issued under the advice of the authorities of the island, made clear the provisions of the laws concerning such railroads as without being considered of general public interest rendered service in connection therewith, it having on the other hand the advantage of being much less exacting in matters pertaining to the projects and providing for a method of procedure more easy and rapid. Of this class of railroads, known as "for special service and public use," many have been built since the year 1888 either by private individuals or by companies who already owned lands for general public service, in the latter case being operated at the present time under the same conditions as the lines for general public service with which they connect. For this reason they are included in the accompanying table, No. 2, which gives the length of the lines of each company.

It may therefore be assured that the said decree of September 25, 1888, besides making clear the railroad law, made it more liberal to the advantage of the railroads of this country.

According to law, railroads for special and private use may be divided into two classes. When they are exclusively within lands belonging to private parties, they may at once be built by the owners by simply giving notification of the fact to the respective governments of the provinces, which latter must report the same to this department. When they have to occupy the public domain, either by crossing public roads of any kind or by crossing or connecting with the railroads for the general public service, etc., petitions accompanied by the project must be presented in order to secure the proper permit, as is determined by articles 73 and 74 of the regulations for railroads.

There exists in the island a multitude of railroads of this class operated in the service of plantations and manufactories without their having secured a legal status.

The railroads of the island are principally within the three most populated prov-

inces—Habana, Matanzas, and Santa Clara. As in those of Pinar del Rio, Puerto Principe, and Santiago de Cuba, there are only a small number of kilometers of lines. Tables Nos. 5 and 7 show the number of kilometers of railroads of general public service by provinces and the density of population of each one of the latter in proportion to the number of kilometers.

#### EXPRESS COMPANIES.

From the beginning of the year 1899 some American express companies commenced to extend their business to this island, among them and upon a larger scale that known as the Cuban and Pan-American Express Company. Some time later its management obtained, through its representative in London, from the board of directors of the United Railway Company of Habana, in the same city, a contract in which no regard was had for the railroad law of this country nor for the obligations that the company has here with the state and the public.

The basis of this contract is that the Cuban and Pan-American Express Company assumes exclusive charge of the transportation and distribution of effects known as "express articles" throughout the entire line of the railroad company, which authorized it at the same time to establish rates to the extent of an increase of 50 per cent upon the prices that the railroad company charged for the said transportation. It was also stipulated that the latter, neither by itself nor by means of its employees or agents, could grant to any other personality whatever during the duration of the contract the right or authority to engage in said transportation business, making known at the same time that the Cuban and Pan-American Express Company was responsible to the public for claims that might arise in connection with the said transportation.

It therefore resulted from the terms of the contract that a monopoly was established in favor of the express company, that it was given the right to raise the tariff rates, which not even the company itself can do without authorization from the government, and that the company was freed from the responsibility that it has to the public and to the state, all of which, as has already been stated, is antagonistic to the laws of this country.

As a consequence of this contract which the express company tried to enter into in a like manner with other railroad companies complaints were entered by the public and by other express companies established in the country. This department giving ear to the said complaints, and the question being one of infringement of the existing laws, the observance of which it is the duty of this department to look after, ordered of its own accord on the 31st of January of this year the annulment of the said contract and all others of like nature that might be in existence in the island entered into by companies of general public service.

The express company established an appeal before the honorable governor-general, who was absent at the time, who decided on February 1 that the effects of the aforesaid order be suspended until his return to this capital. From the said date and the decree continuing in suspension, different authorities have been heard as to the validity of the contract and of the source of the decree that annulled it, the opinions of which have coincided with that of this department in the premises, which has been more than once asked for explanations of the grounds of its decree.

After the aforesaid course of procedure, in which more than five months transpired, Order No. 290 of July 16 was published, again declaring annulled the contract of the Cuban and Pan-American Express Company with the united railways of Habana and all others entered into with companies of general public service that might be in the same condition. The express company established an appeal for revision before the administrative council against this latter decree, the general government directing on July 20 the suspension of the aforesaid order—that is to say, leaving in force the contract until the appeal for revision is decided.

Although the last rulings cited had been issued at a later date than the period embraced by this report, reference is made to them in order to make the matter complete up to the present time, which is one of real importance to the country, not alone by the injury that the existence of the said contract causes, but because it implies the noncompliance with important laws in force in Cuba by foreign companies.

#### AMENDMENTS TO THE RAILROAD LAW.

The railroad law in force was promulgated by the Government of Spain for application to railroads in that country, the conditions of which differ very much from those of the railroads in this island. The Spanish railroads have been almost all subsidized by the state by guarantee of the capital invested in them, the state being coowner of some of them, for which reason, according to the said law, the government has the right of intervention in the management of the companies, this not

being the case in this island, where railroads are the result of private enterprise, without the government having given them any other aid than the exemption from custom-house duty on the necessary materials for their building and operation for a certain period.

From this circumstance and that of special concessions that many railroads have in this island from the respective grants, it is difficult to apply in every case the said law in Cuba, in which the Government of Spain ordered that it be effective, without making therein the necessary preparations and changes indispensable for its application. This was recognized in the decree that promulgated the said law in Cuba, inasmuch as it declared that for the application of the latter it is necessary to make therein alterations that will make it adaptable to the administrative organization of this country, which alterations were not made.

This department has under consideration the making of a careful study of the said law in order to be able to recommend the modifications that will make it adaptable to this country, at the same time making it more liberal by simplifying the complicated procedure specified in certain cases.

There are in the island railroads whose high tariff rates are detrimental to the development of the districts where they are situated, without on the other hand their earnings, operating expenses, profits, etc., being in proportion to the said high tariff rates, and this matter of tariffs is an important problem that this department has undertaken to solve in accord with the railroad companies, which, in general, have shown their willingness to give their aid to the purpose in view, which is that of modifying and lowering the present tariff rates. To arrive at this end a certain difficulty is caused by the law itself, which after establishing the right of the government to revise the tariffs every five years specifies to the latter its duty to guarantee to the railroad companies at least the income of the preceding year, and besides, the average increase that may have taken place during the five preceding years.

Such obligation on the part of the government is comprehensible in Spain from the before-mentioned circumstance of the state being interested in the earnings of railroads, but not in this island. The government, here as in reality it does not have any intervention in the management and finances of the railroad companies, the provisions of the second paragraph of article 49 of the law can not be carried out because it would render impossible to the public without disregarding the rights of the company by applying the first part of said paragraph. Besides, the obligation of taking as a base for compensation to companies the earnings of the preceding year might not be equitable, neither for them nor for the State, inasmuch as the earnings of any one year may vary greatly from the one preceding or the one following.

From the above reasons, and while the variations that will be made in the railroad law are being completed, this department has recommended to the honorable governor-general the modification of article 49 of the law in the following manner:

"After the first five years of operation of a railroad and when the government may deem it convenient to public interests, the revision of tariffs shall be proceeded with, the government to have always in consideration the special conditions of the locality through which the railroad in question passes and always calculating a reasonable interest for the company."

According to the same law the turnpikes and other public roads may be partly occupied lengthwise by railroads and tramways. From the said practice comes the trouble that in reality the section of the road taken up by the railroad is rendered useless and the balance at least is interfered with; furthermore, there is no reason whatsoever that can justify the granting to companies or private parties the privilege of building a railroad on a turnpike or road, the operation of which, as well as its rolling, building, etc., have cost money of the state, and which receives no compensation for the privilege granted. Besides this circumstance there is the other that this department has adopted the width of 5 meters for the firm roadbed in the construction and repair of all roads, having in view the economical advantage thus secured, which renders possible making repairs to the greatest extent on the many roads of the island that require them, and it is evident that by taking up a part of the said width of 5 meters by a railroad or tramway almost the entire width of the road would be rendered useless.

From the foregoing reasons this department, by and with the consent of the honorable governor-general, has prohibited the occupancy of turnpikes or public roads lengthwise by railroads or tramways of any kind whatsoever, and consequently changing the railroad law in force in its part that refers to this particular.

#### TAXES.

The railroad companies of general public service, by virtue of different rulings of sundry dates, never paid any other tax than that of a certain percentage on their profits, as the said rulings admit the propriety that railroads should not be subject to

municipal levies nor to taxes on real estate, for the lands, station houses, warehouses, and other buildings used in connection with their business. The percentage of their profits that they were accustomed to pay as an only tax was changed several times, it having been fixed first on the divisible profits, and latterly 4.7 per cent were paid upon products of all kinds.

This latter system has nevertheless been changed by decree of the present department of finance, according to which the companies must continue to pay the tax upon their incomes and besides the proper real estate tax for their station houses, warehouses, and other buildings to the respective municipalities.

The opinion of this department concerning this important point, and which it has upheld in sundry reports to the superior authorities, is that railroad companies should only pay one tax upon their income, not only from its being the most appropriate and equitable means of preventing the tax from becoming costly to the said companies, which owing to the present condition of the country can with difficulty pay operating expenses, but also to avoid the numberless difficulties that arise in the assessment and collection of taxes by the municipalities through which the railroads pass of the part that corresponds to them.

If the purpose of the decree of the department of finance is to furnish municipalities with a new source of income whereby they may better attend to their obligations, it might be done by increasing the percentage that the railroad companies pay on their incomes to at most 6 per cent, the treasury making a distribution of 3 per cent thereof among the ayuntamientos in proportion to the number of kilometers of road that each company may have in the terminos.

#### CLASSIFICATION OF MERCHANDISE AND MODIFICATION OF TARIFFS.

As has been before stated, this department has commenced efforts for the purpose of obtaining the regulation and reduction of railroad tariffs in the interests of the reconstruction of the country, having already secured, as an aid to the said end, that the government suppress the tax of 3 and 10 per cent on tariff rates of merchandise and passengers that were being paid by the public. Coinciding with this measure there has been an important reduction in importation duties on railroad supplies.

The aforesaid matter of new taxes which the recent decree of the finance department imposes upon railroads is submitted to the decision of the administrative council before which the representatives of the railroad companies appealed for its revision.

#### FORAKER LAW.

The provisions of the Foraker law prohibit the granting of concessions with the object of preventing the country from contracting, for the future, obligations in which at the present time it can have no intervention from its being without true representation in the meanwhile that the island is without its own government.

In the application of this just principle vacillations took place that exaggerated its scope by making it applicable to all kinds of concessions of whatever nature. This department understood that the provisions of the said law embraced such concessions that in any manner affected public service and in which from the importance of the latter it might be necessary to establish mutual duties and rights between the state and the concessionary which in future might become costly to the country, but that it could not refer to concessions of a private nature in which although in some manner public interests were affected, their granting did not place the state under any obligations, such as railroads, wharves, etc., for the private use of any industry. The question having been submitted to the superior authorities, the latter approved of the opinion of the department, although with the precise condition that permits and not concessions should be granted, and that the permits were of provisional character; on this basis permits have been issued for some railroads and wharves for private use.

The said form of applying the Foraker law, in special cases, has already produced advantages, as, while the fact has not been made generally known to the public, some railroads and wharves have been built for the private use of sugar plantations and mines.

There is another important point which, although it has not been decided in a general way, by a special ruling it has been decided in each case according to circumstances. It relates as to whether or not the concessions of different kinds granted by the Spanish Government after the signing of the treaty of peace are valid. In some cases it has been resolved by the honorable governor-general that they are not valid and the parties interested have taken an appeal before the administrative council against said decision.

The opinion of this department in the premises is that such concessions as were petitioned for and proceeded with at least before the signing of the treaty of peace should be considered valid if all the provisions of the law relating thereto were com-

plied with and they were issued within the limits and upon the terms approved by the same law, and that such as were petitioned for and proceeded with after the signing of the treaty should be considered null and void, inasmuch as after the signing thereof the exercise of the sovereignty of Spain in this island was only effective for the purpose of contributing to the evacuation of the island, this being the opinion sustained by the Government at Washington in its correspondence with the American commission of evacuation.

#### LENGTH AND CLASSIFICATION OF RAILROADS.

As has been already stated, there are many railroads for special and private use concerning which this department has no data, for which reason to be able to state their lengths and kilometers it is necessary to base it upon an approximate calculation, which is the following:

Licensed roads with known length, 489 kilometers. Licensed roads of the length of which there are only suppositions, from the circumstance that, in addition to the part of the public domain which they occupy, they are operated within private properties according to the requirements of the industries which they serve, 65 lines, with an average of 5 kilometers each, 325 kilometers. Unlicensed roads, the length of which is absolutely unknown, prudently calculated, 150 kilometers. A. The length of railroads of general public service, including as such those of private and public use that connect with the former, from the aforesaid circumstance of their performing a service analogous to that of the lines of general public service of the companies of which they form a part: 1,698.677 kilometers. (Table No. 2.) B. The length of railroads of private and public use, including among them those which connect with them and form a part of the line of general service, is 427.893 kilometers. (Table No. 3.) (Not included in the sum, from a part of the same being already included in Table No. 2.) C. The length of railroads of public and private use that do not connect with lines of general public service is 153.408 kilometers. (Table No. 4.) The length of railroads of special and private service according to the aforesaid estimate is 964 kilometers. E. The length of railroads that are to-day abandoned or have been built by military authorities which have always controlled them are: Trinidad Railroad, 29.443 kilometers; railroad from Jucaro to Moron (military), 60 kilometers; Tricornia military road, 12.030 kilometers. (Table No. 6.)

STATEMENT NO. 1.—*Statement showing the lines of the general plan and their lengths and points at which they touch or pass near by.*

Name of each line.	Town or termino through which they pass or go near thereto.	Length of each line in kilometers.
From Santa Clara to Ciego de Avila by San Andres.	Santa Clara, Manajanabo, Ragueta, San Andres, Manacas, Pirindingo, Corojal, Jiquimas, Arroyo Grande, Taguasco, Lagitas, Rio Grande, Jicotea y Ciego de Avila.	150
From Santa Clara to Sancti Spiritus.	Santa Clara, Rebacadero, Baez, Nazareno, Las Pozas, Macaguabo, Sancti Spiritus.	80
From Sancti Spiritus to Ciego de Avila.	Sancti Spiritus, Zaza, Camoa, Ceja de Guayacanes, Gilocas, Ciego de Avila.	181
From Ciego de Avila to Puerto Principe.	Ciego de Avila, Ojo de Agua, Cumanayagua, Los Guiritos, San Geronimo, Las Yaguas, Puerto Principe.	100
From Puerto Principe to Las Tunas.	Puerto Principe, La Vieja, Juan Gomez, El Zanjon, Palo Quemado, Guaimaro, Jobabo, Las Minas, Rompe, Las Tunas.	125
From Santa Cruz del Sur to Puerto Principe.	Santa Cruz, Sabanilla, Pedregal, Jimiru, Guarecos, Puerto Principe.	78
From Las Tunas to Las Enramadas by Bayamo.	Las Tunas, Las Arenas, Cauto del Embarcadero, Caureje, Bayamo, Santa Rita, Jiguani, Baire Abajo, Fray Juan, Arroyo Blanco, Palma Soriano, Paso del Corralillo, Las Enramadas.	169
From Las Tunas to Las Enramadas by Holguin.	Tunas, Guillen, Las Parras, Cabezuclas, Holguin, La Vega, San Francisco, La Canoa, Barajagua, Cauto Abajo, Burenes, Las Enramadas.	150
From Bayamo to Manzanillo	Bayamo, Barracas, Yara, Manzanillo .....	54
From Cristo to Santa Catalina del Guaso.	Cristo, Ti Arriba, Tiguabos, Santa Catalina de Guaso.....	.....
From La Canoa to the Bay of Nipe.	La Canoa, Barajagua, La Vieja, Centeno, Juliana, Guaro, Mayari Arriba y el Embarcadero.	.....
From Santa Catalina de Guantanamo to Sagua de Tanamo.	Santa Catalina de Guantanamo, Guaro, El Alto de la Juara, Jamagua, Sagua de Tanamo y el Embarcadero.	.....
From San Miguel de Nuevitas to Zanja.	San Miguel de Nuevitas, San Isidro, La Ceiba, Guaimaro, Berrocal, Lajas, Loreto, Palo Seco, Jobabo, Zanja.	89
From Pinar del Rio to the Puerto de los Arroyos.	Pinar del Rio, San Luis, San Juan y Martinez, Sabalos, Guanés, Mantua, and Los Arroyos.	.....
From Mariel to Artemisa....	Mariel, Guanajay, Artemisa .....	.....
Total length of the system .....		1,472

STATEMENT NO. 2.—*Showing the lengths of the railroads of general public service and those of special service and public use that connect with the former and are subject to the inspection of the department of public works*

Names of the concessionaries.	Between what places.	Grounds of concession.	Kilometers in operation.	
			Partial.	Total.
United companies of Habana.	Habana to Union .....	General public service.	124.309	416.415
	Rincon to Guanajay .....	.....do.....	34.120	
	San Felipe to Batabano.....	.....do.....	15.550	
	Guines to Matanzas.....	.....do.....	57.950	
	Sabana de Robles to Madruga.....	.....do.....	6.440	
	Regla to Bamba.....	.....do.....	142.250	
	Regla to Guanabacoa.....	.....do.....	4.800	
	Connecting road between the Bahia and Coliseo companies at Matanzas.	.....do.....	.800	
	Road from Coliseo Station to Guamacaro Valley.	Public use.....	16.000	
	Connecting road between the Bahia and Habana lines, from Regla to Cienaga.	General public service.	8.000	
Western Railway of Habana.	Alfonso XII.....	Public use.....	6.196	177.621
	Habana to Pinar del Rio .....	General public service.	177.210	
	Connecting road with the Habana lines at Rincon.	.....do.....	.411	
Marianao Railroad ....	Habana to Marianao and to the Playa ..	.....do.....	13.039	13.267
	Connecting road with the United Company's lines, at Cienaga.	.....do.....	.228	
Habana Electric Railroad.	San Juan de Dios to Cerro, Cristina Bridge to Jesus del Monte, from San Francisco to la Punta, from the Punta to Carmelo and branch through Principe Alfonso street.	.....do.....	21.347	21.347
Cuban Electric Railroad.	Regla to Guanabacoa and prolongation as far as the Asuncion Square.	.....do.....	4.918	4.918
Matanzas Railroad ....	Matanzas to Guareiras.....	.....do.....	106.117	255.784
	Guareiras to Cumanayagua.....	S. S. and P. U.	13.006	
	Navajas to Torriente.....	General public service.	19.817	
	Torriente to Jaguey Grande and to Murga	S. S. and P. U.	26.200	
	Navajas to the sugar plantation Atrevido	.....do.....	18.000	
	Guareiras to Colon.....	.....do.....	9.000	
	Branch from Guira to sundry plantations to the north of the town, narrow gauge.	.....do.....	14.000	
	Branch to Cabezas.....	.....do.....	18.600	
	Branch to the sugar plantation La Rosa.	.....do.....	13.800	
	Branch to the sugar plantation Angostura	.....do.....	8.250	
	Branch to the sugar plantation Conchita.	Special service.	6.000	
	Branch to the sugar plantation Perla.....	.....do.....	3.000	
	Cardenas to Pizarro.....	General public service.	6.330	
	Cardenas to Esperanza.....	.....do.....	154.766	
	Bemba to Navajas.....	.....do.....	15.883	
United Railroad Companies of Cardenas and Jucaro.	Jucaro to Calimete.....	.....do.....	61.399	332.637
	Calimete to Amarillas.....	Special service.	6.400	
	Amarillas to Yaguaramas.....	S. S. and P. U.	32.350	
	Recreo to Sabanilla de la Palma and to Itabo.	General public service.	23.009	
	Branch from Altamisal to Macagua .....	.....do.....	32.500	
	Port of Sagua to Enerucijada .....	.....do.....	56.312	
	Enerucijada to Camajuani .....	Public use.....	27.729	
	Sitiecito to Cruces.....	General public service.	55.927	
	Sagua to Chinchila and to Caguaguas .....	Public use.....	15.345	
	Branch to Calabazar.....	S. S. and P. U.	3.360	
Railway Company ....	Caibarien to Placetas (broad gauge).....	General public service.	54.053	215.126
	Connecting road with the city passenger road of Caibarien on outskirts of the town.	.....do.....	2.400	
	Caibarien to Placetas (narrow gauge)...	Public use.....	35.753	
	Cienfuegos to Villaclara .....	General public service.	68.528	
	Palmira to Parque Alto.....	Special service.	23.600	
Tunas and Sancti Spiritus Company.	San Juan de Yeras branch .....	.....do.....	8.000	351.007
	Tunas to Sancti Spiritus .....	General public service.	38.623	

STATEMENT No. 2.—*Showing the lengths of the railroads of general public service and those of special service and public use that connect with the former and are subject to the inspection of the department of public works—Continued.*

Names of the concessionaries.	Between what places.	Grounds of concession.	Kilometers in operation.	
			Partial.	Total.
Gibara and Holguin Railroad.	Gibara to Holguin .....	General public service.	32.000	32.000
Guantanamo Railroad	Santa Catalina to la Caimanera .....	do .....	20.425	
	Branch to Soledad .....	do .....	.723	
	Branch to Jamaica .....	do .....	5.400	26.548
Santiago de Cuba Railroad.	Santiago de Cuba to Sabanilla .....	do .....	33.507	
	Branch from Cristo to Ponupo .....	S. S. and P. U. .....	21.000	54.507
Puerto Principe and Nuevitas Railroad.	Puerto Principe to Nuevitas .....	do .....	73.690	
	Branch from Nuevitas Station to the warehouses of the port.	do .....	.313	74.003
	General total .....			1,798.677

STATEMENT No. 3.—*Showing the length of railroads of special service and public use. (Those of this kind are included which connect with lines of general public service and the lengths of which have been included in that of the latter.)*

[Length in operation.]

	Meters.		Meters.
Carahatas to Casa Calvo .....	4,145	Sardinas branch (La Rosa) of Matanzas railroad .....	13,800
Las Pozas to Mayorquin .....	2,750	Angostura branch (Caimital cane farm) of Matanzas railroad .....	8,250
San Miguel to Baga .....	8,995	Amarillas Station on Cardenas and Jucaro railroad to Yaguaramas .....	32,350
Sierra Morena to the River Store.	5,385	Eneruejada Station on Sugar railroad to Camajuani .....	27,729
The Embarcadero de Picadillo to the Sagua road, to las Pozas (tramway) .....	3,535	Caracas central sugar factory of Emilio Terry to Limones plantation (narrow gauge) .....	24,248
Navajas Station of the Matanzas railroad to the Atrevido sugar plantation .....	18,000	Kilometer 18 of the line of the Caracas central sugar factory to Limones, to Rio Salado .....	15,950
Colisco to Guamacaro .....	16,000	Branch leaving the Matanzas railroad station at Union and reaching the Conchita sugar plantation .....	6,000
Caibarien to Placetas (narrow gauge) .....	35,753	Perla Branch of the Matanzas railroad .....	3,000
The Guira Station on Matanzas railroad to different sugar plantations to the north of the town (Sanchez branch) .....	14,000	Section of Jucaro line between Calimete and Amarillas .....	6,400
Sagua to Chinchilla .....	8,000	Branch from Palmira to Parque Alto .....	23,600
Chinchilla to Caguagua .....	6,625	Branch to San Juan de las Yeras .....	8,000
Union de Reyes to Alfonso XII .....	6,196	Railroad to the Daiquiri mines .....	6,000
Santiago de Cuba to the Juragua mines .....	27,000	Santiago railroad station Cristo to Ponupo .....	21,000
The Caridad sugar plantation to Rancho Veloz and a connecting line with the Mayorquin railroad .....	5,022	Total .....	427,893
Kilometer 52 of the Sagua line to Calabazar .....	3,360		
The Guareiras Station on Matanzas railroad to Cumanayagua .....	13,000		
The Torriente Station on Matanzas railroad to Jaguey Grande and to Murga .....	26,200		
The Guareiras Station on Matanzas railroad to Colon .....	9,000		
Crespo branch (Cabezas) of the Matanzas railroad .....	18,600		

STATEMENT No. 4.—*Showing the lengths of the railroads for special service and public use, which do not connect with the lines of general public service.*

[Length in operation.]

	Meters.		Meters.
Carahatas to Casa Calvo .....	4,145	The Caridad sugar plantation to Rancho Veloz and a connecting branch with the Mayorquin Railroad .....	5,022
Pozas to Mallorquin .....	2,750	Caracas central sugar factory to Limones plantation .....	24,248
San Miguel to Baga .....	8,995	Kilometer 18 on the Caracas and Limones line to Rio Salado .....	15,950
Sierra Morena to the River Store.	5,385	Total .....	163,408
Embarcadero de Picadillo to the road from Sagua to Las Pozas .....	3,535		
Caibarien to Placetas (narrow gauge) .....	35,753		
Sagua to Chinchilla and to Caguagua .....	14,625		
Santiago de Cuba to the Juragua mines .....	27,000		
Santiago de Cuba to the Daiquiri mines .....	6,000		

STATEMENT No. 5.—*Length by provinces of the railroads of general public service and of special service and public use which connect with the former.*

Name of railroad.	Length within the province of—						Total length by companies.
	Pinar del Rio.	Habana.	Matanzas.	Santa Clara.	Puerto Principe.	Santiago de Cuba.	
	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>
Habana Electric R. R. ....		21,347					21,347
Western R. R. ....	116,121	61,500					117,621
Marianao. ....		13,267					13,267
Unidos de la Habana. ....	6,300	256,188	155,927				416,415
Cuban Electric R. R. ....		4,918					4,918
Matanzas. ....			255,784				255,784
Cardenas y Jucaro. ....			253,760	78,877			332,637
Cuban Central. ....				351,007			351,007
Tunas to Sancti Spiritus. ....				38,623			38,623
Puerto Principe to Nuevitas. ....					74,003		74,003
Gibara to Holguin. ....						32,000	32,000
Guantanamo. ....						26,548	26,548
Santiago de Cuba. ....						54,507	54,507
Total length by provinces. ....	122,421	357,220	663,471	468,507	74,003	113,055	.....
Total length of roads in the island. ....							1,798,677

STATEMENT No. 6.—*Showing the railroads that are operated by the military government without intervention on the part of the department of public works.*

Name of line.	Length.	Observations.
	<i>Meters.</i>	
Trinidad R. R. ....	29,443	Through abandonment of the concessionaries the government assumed charge, and at the present time it is operated by the military government from Casilda to Trinidad.
Jucaro and Moron R. R. ....	60,000	It was built and operated by the Spanish military authorities and is at the present time in charge of the military government.
	12,030	Recently built by the military government for its special service.
Total. ....	101,473	

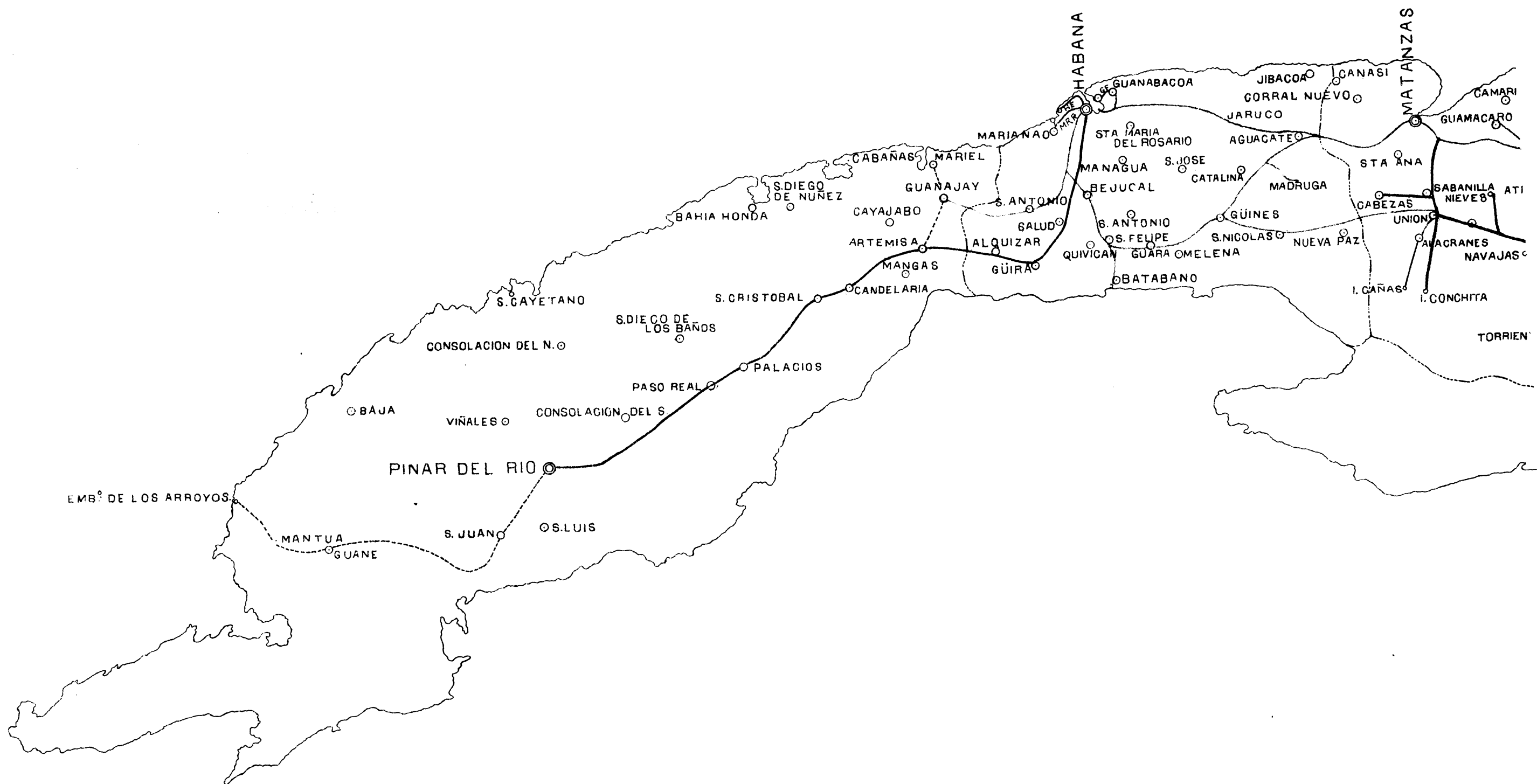
STATEMENT No. 7.—*Showing the density of population of each province and length in kilometers of railroads of general public service in operation therein.*

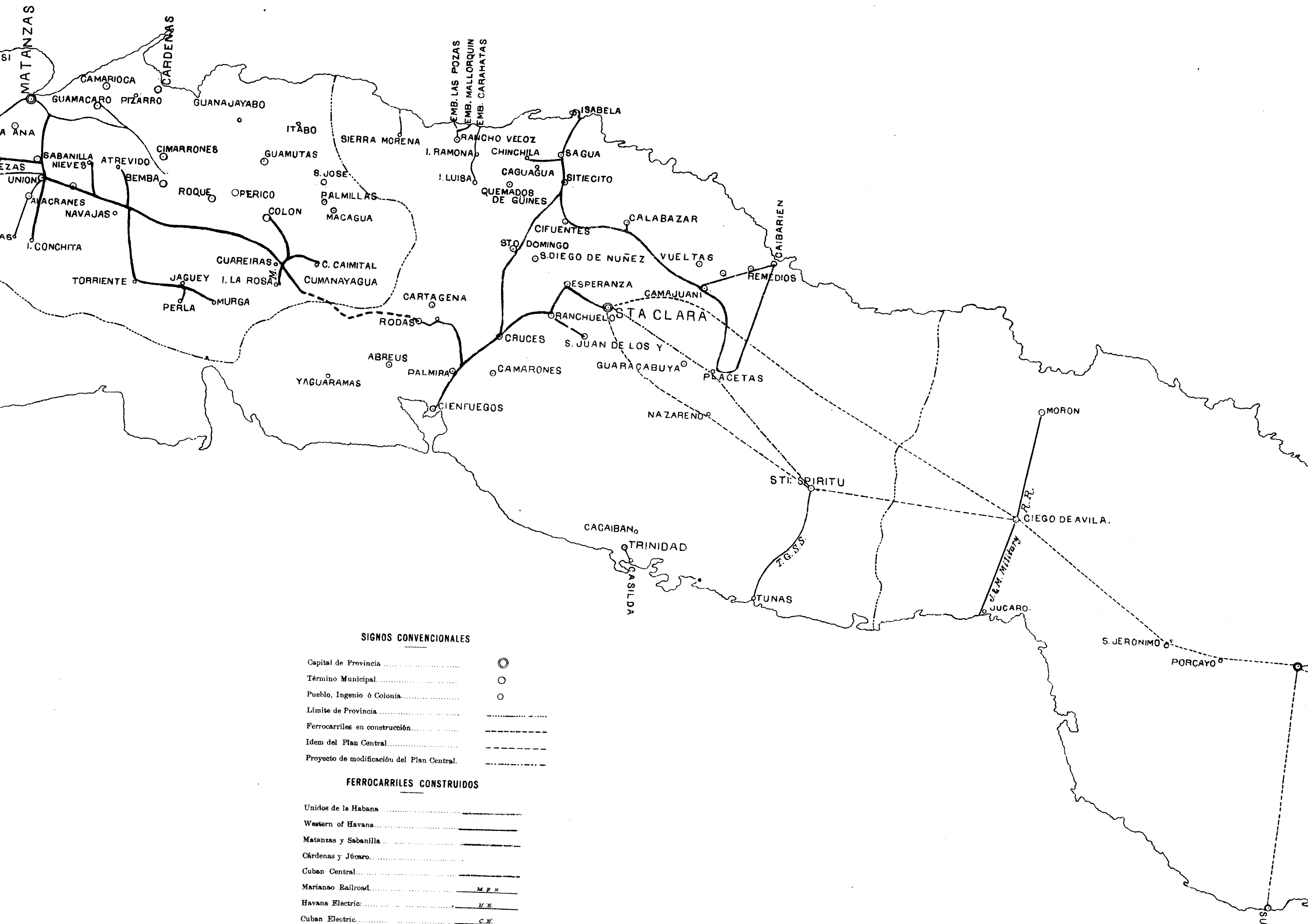
Province.	Area.	Inhabitants.	Length of railroad of general public service.	Inhabitants per kilometer of railroad.	Inhabitants per square kilometer.
	<i>Square kilometers.</i>		<i>Kilometers.</i>		
Habana. ....	7,179	423,561	357	1,186	59
Matanzas. ....	9,583	201,243	663	304	21
Pinar del Rio. ....	12,953	181,342	122	1,486	14
Santa Clara. ....	24,761	346,654	469	739	14
Puerto Principe. ....	27,195	81,585	74	1,103	3
Santiago de Cuba. ....	32,292	322,920	113	2,858	10
Total. ....	113,963	1,557,305	1,798	7,676	121

STATEMENT No. 8.—*Present names of the railroad companies and of the former independent ones that constitute them to-day.*

United Railroad Companies of Habana:  
 Habana Railroad Company.  
 F. C. de la Bahia de la Habana.  
 F. C. de Union a Alfonso XII.  
 United Railroad Companies of Cardenas and Jucaro:  
 Cardenas Railroad Company.  
 Jucaro Railroad Company.







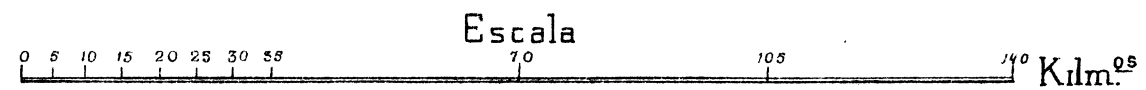
SIGNOS CONVENCIONALES

Capital de Provincia .....	⊙
Término Municipal .....	○
Pueblo, Ingenio ó Colonia .....	○
Límite de Provincia .....	-----
Ferrocarriles en construcción .....	- - - - -
Idem del Plan Central .....	- - - - -
Proyecto de modificación del Plan Central .....	- - - - -

FERROCARRILES CONSTRUIDOS

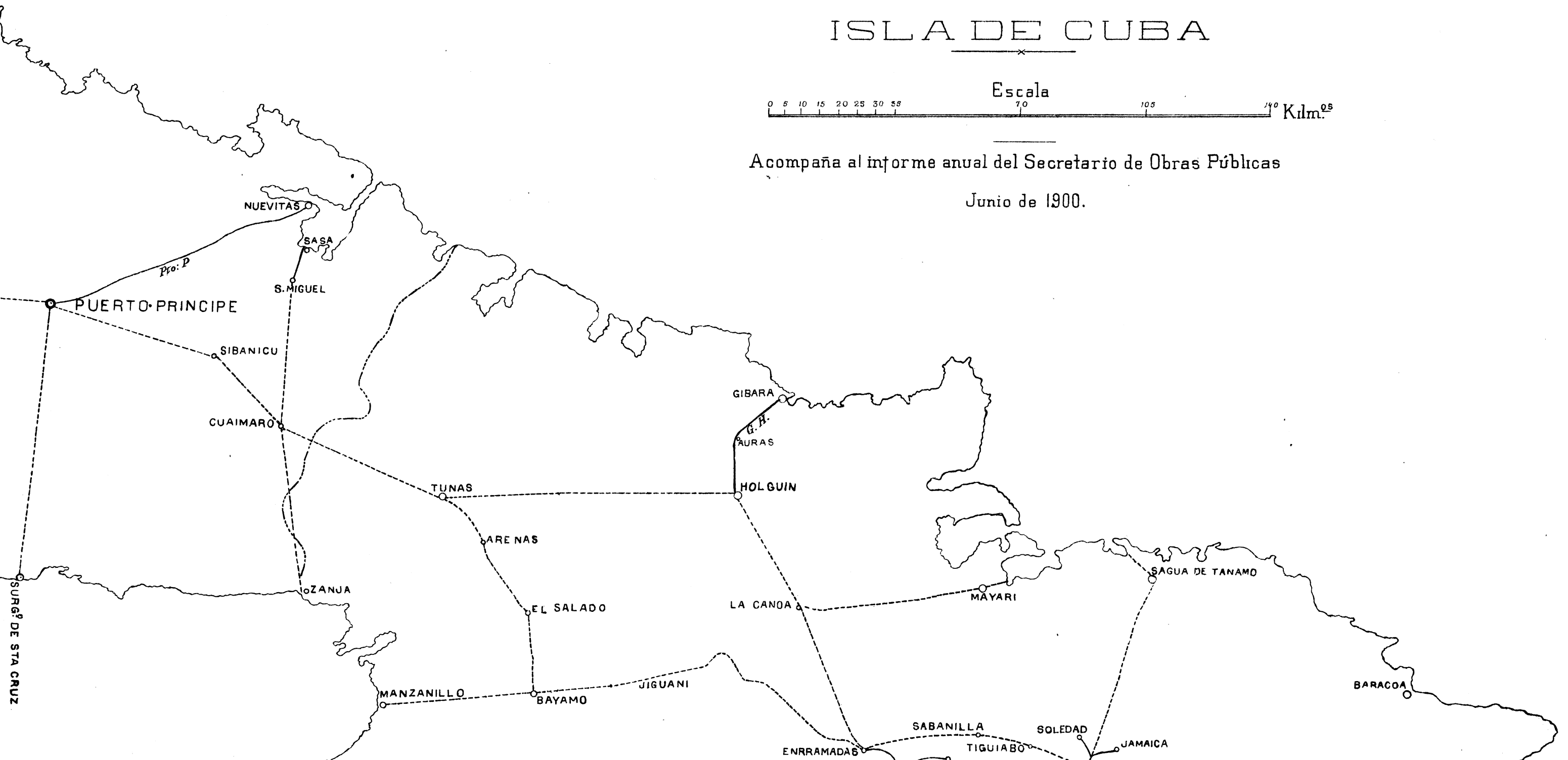
Unidos de la Habana .....	—————
Western of Havana .....	—————
Matanzas y Sabanilla .....	—————
Cárdenas y Júcaro .....	—————
Cuban Central .....	—————
Marianao Railroad .....	M.F.R.
Havana Electric .....	H.E.
Cuban Electric .....	C.E.

# PLANO GENERAL DE LOS FERROCARRILES DE LA ISLA DE CUBA

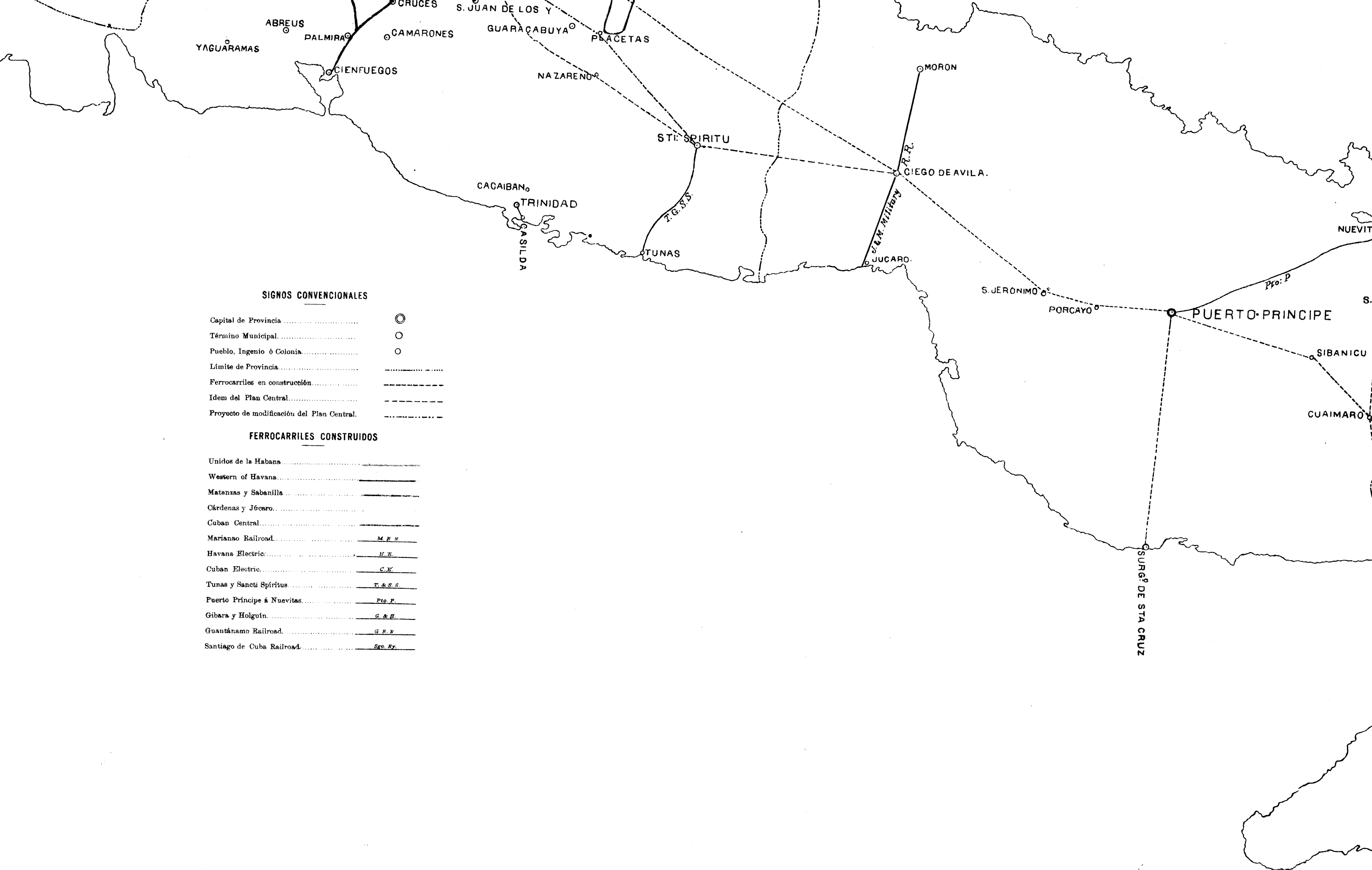


Acompaña al informe anual del Secretario de Obras Públicas

Junio de 1900.







**SIGNOS CONVENCIONALES**

Capital de Provincia .....	⊙
Término Municipal .....	○
Pueblo, Ingenio ó Colonia .....	○
Límite de Provincia .....	-----
Ferrocarriles en construcción .....	- - - - -
Idem del Plan Central .....	- - - - -
Proyecto de modificación del Plan Central .....	- . - . -

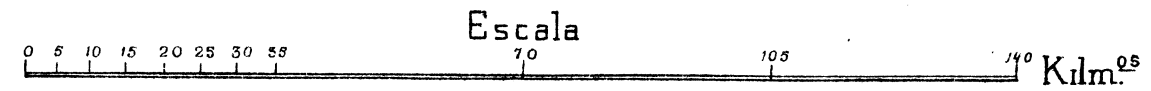
**FERROCARRILES CONSTRUIDOS**

Unidos de la Habana .....	=====
Western of Havana .....	=====
Matanzas y Sabanilla .....	=====
Cárdenas y Júcaro .....	=====
Cuban Central .....	=====
Marianao Railroad .....	<u>M. R. R.</u>
Havana Electric .....	<u>H. E.</u>
Cuban Electric .....	<u>C. E.</u>
Tunas y Sancti Spíritus .....	<u>T. &amp; S. S.</u>
Puerto Príncipe á Nuevitas .....	<u>Pto. P.</u>
Gibara y Holguín .....	<u>G. &amp; H.</u>
Guantánamo Railroad .....	<u>G. R. R.</u>
Santiago de Cuba Railroad .....	<u>Sgo. Ry.</u>

# FERROCARRILES

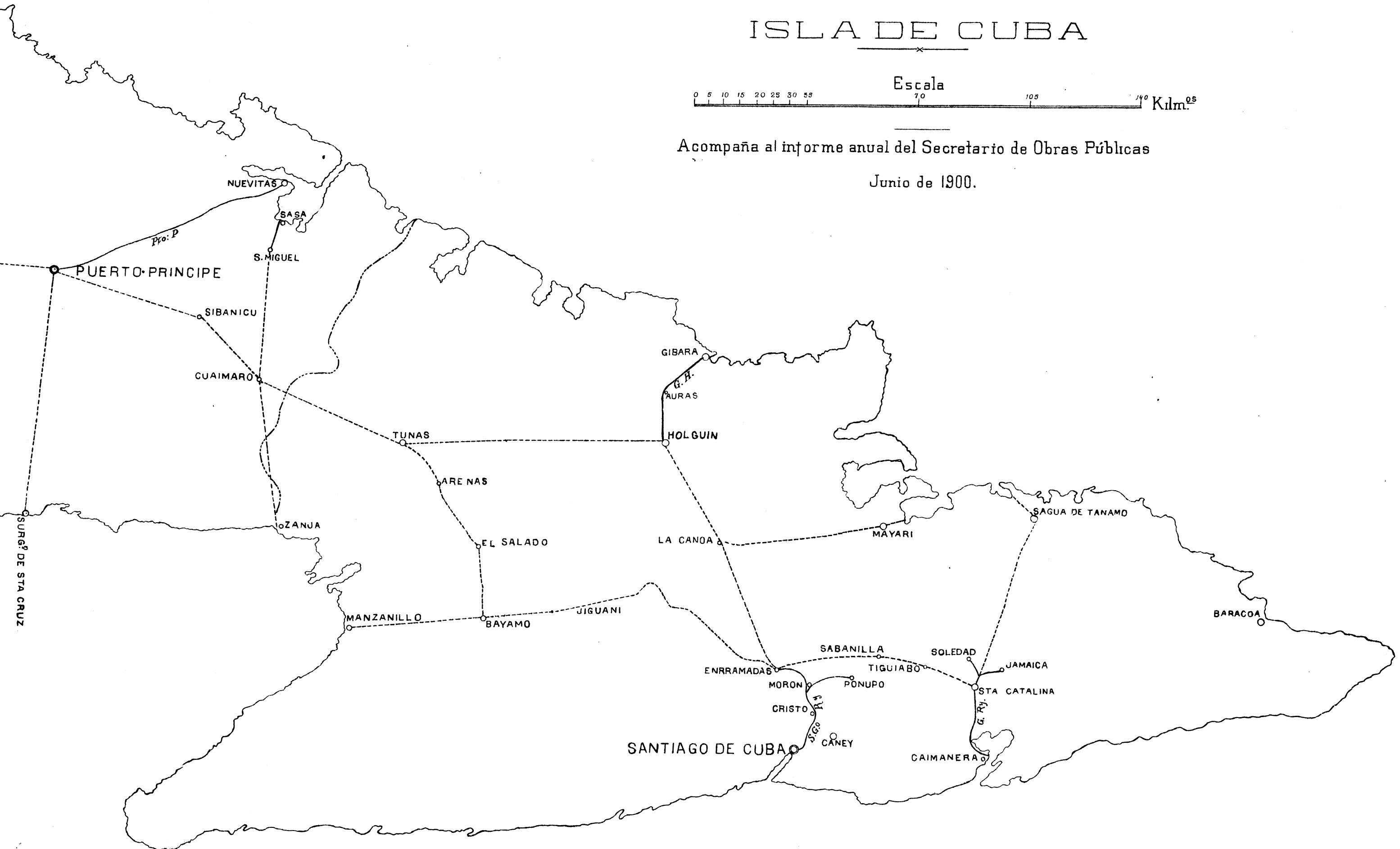
DE LA

## ISLA DE CUBA



Acompaña al informe anual del Secretario de Obras Públicas

Junio de 1900.





Matanzas Railroad Company, Matanzas and Sabanilla Railroad Company.  
 Cuban Central Railway Company:  
   Sagua la Grande Railroad.  
   Railroad from Sagua to Chinchila and Caguagua (narrow gauge).  
   United Railroad of Caibarien and Zaza.  
   Railroad from Cienfuegos to Villaclara.  
 Western Railway of Habana, Western Railway Company.  
 Cuban Electric Railway, The Prueba Railroad.  
 Habana Electric Railway, City Passenger Railway of Habana.  
 Holguin and Gibara Railroad Company, Holguin and Gibara Railroad Company.  
 Guantanamo Railroad, Guantanamo Railroad.  
 Puerto Principe and Nuevitas Railroad Company, Puerto Principe and Nuevitas Railroad Company.  
 Santiago de Cuba Railroad Company, Santiago de Cuba Railroad Company.  
 Marianao Railroad Company, Marianao Railroad Company.  
 Tunas and Sancti Spiritus Railroad Company, Tunas and Sancti Spiritus Railroad Company.

#### RECOMMENDATIONS.

The complete lack of means of communication demands the pressing necessity of giving special attention to the building of turnpikes that will bring prosperity to the country by furnishing facilities of transportation to market of its products. The plan for roads presented in the preceding pages constitutes the principal system of arteries for the agricultural and commercial development of the island, and all the roads projected are of absolute necessity. The principal roads and public works that require preferred attention are the following ones:

##### IN PINAR DEL RIO.

The road from Cabañas to Bahía Honda, a rich sugar district that will have shipping facilities at both ports.

The road from Bahía Honda to Palma, that traverses a zone that was formerly one of the richest in the province, but was completely ruined during the war and needs a powerful stimulant to restore it to its former condition.

The road from Pinar del Río to Guane, passing by San Juan y Martínez and with a branch to Bailén or Punta de Cartas. It will have various bridges over the Galiano, Trancas, Colorado, Tío Pilar, Medio, La Pescadora, Curamaguey, and Perico streams. This district is the famous Vuelta Abajo, universally renowned for its tobacco, and which will be favored not only by having improved transportation facilities, but also by having a shipping port on the south coast, which would force the Western Railroad Company to considerably lower its freight rates.

The road from Guane to Arroyos, passing through Mantua; districts similar to the former, but with shipping point on the north coast. This road will require the building of bridges over the Bagazal stream at an approximate cost of \$3,000.

Road from Pinar del Río to the Esperanza shipping port on the north coast, passing through Viñales, a magnificent district for the cultivation of tobacco and of much traffic.

The bridge of San Cristóbal over the river of its name at the turnpike crossing is very necessary, as its destruction has left the town of San Cristóbal, the present terminus of the road, completely isolated. It will cost in the neighborhood of \$12,000.

##### PROVINCE OF HABANA.

Preservation and repair of the existing roads; building a road from Managua to the port of Batabano. This is one of the most important works of the island, the effects of which will be immediately felt. In the first place it would connect two important commercial towns and would open easy, rapid, and cheap communication between the two coasts, the first result of which would be the cheapening of railroad rates between both points. In the second place, the products of the south coast of the island—above all, cattle from the Camaguey district—would have easy access to Habana, and it would break up the monopoly at present existing in the meat market of this city by cheapening the prices. In the third place, and with the construction of roads in Vuelta Abajo, the tobacco of that region shipped at Punta de Cartas to Batabano would be easily and cheaply transported to this city by becoming exempted from the payment of high Western Railroad tariffs, the only means that the tobacco planters of Vuelta Abajo have of sending their tobacco to this market.

The road from Rincon to San Antonio de los Baños, Guira de Melena, and Alquizar. This district is known by its tobacco, which is held in higher estimation in the market than that of Vuelta Abajo and the cultivation of which is almost unproductive



at the present time on account of the high railroad freights. As soon as this road is built the importance of the crops will be greatly increased. This road will be of more importance to Habana than any of those already built.

Cleaning and sanitation of the Ariguanabo River and Lake. This lake is the largest one existing in the island, with only one outlet, which is the Ariguanabo River, which on arriving at San Antonio de los Baños disappears through a sink into the ground. In dry weather the current of the lake and river is slow, for which reason there are many diseases in the vicinity, and in the rainy season the amount of water collected is so great that the natural sink has not a sufficient capacity to take in the whole of it, and when there is any obstruction in the sink the river rises and overflows its banks, inundating the entire neighborhood as far as Alquizar, causing in such years the ruin of the tobacco crop and the suspension for three or four weeks of all country work.

Prolongation of the road from Gallega, passing through Minas, Campo Florido, and San Antonio del Rio Blanco del Norte, connected at Canasi with the road that is being built from Matanzas to this latter town. The importance of this road consists not only in the immediate development of the lands that it traverses and the connection of the two cities of Habana and Matanzas, but also in the fact that it will force the United Railroad Companies to reduce transportation rates.

Road from Caunao to Jaruco, passing through Guajay, Santiago de las Vegas, Managua, Cuatro Caminos, and Tapaste. This road is an important one because it will place in connection with each other all the existing roads which separately converge at Habana without there being between them any easy means of communication.

The building of modern edifices for the uses of all branches of education, collegiate and professional, establishing here the first center of education in the whole of Latin America, equal to the best in the United States and Europe. This will be a matter for a special report.

#### PROVINCE OF MATANZAS.

Continuing until finished the road from Matanzas to Canasi. Of this road five kilometers are already built.

Continuing the road from Matanzas to La Cidra and Santa Clara. There are at Cidra several sugar plantations that are obliged to pay exorbitant freight rates to the railroads, which would have to reduce the same when the road is built.

Road from Matanzas to Cardenas; very necessary because the only means of communication existing between the two cities to-day is by the United Railroad Companies and the Cardenas and Jucaro Company, which service is deficient.

The building of a government wharf for the use of the commercial interests of the city.

The commercial importance of Matanzas demands the building of a wharf to which vessels of deep draft arriving at the port may come, and which can not at the present time come near to the shore owing to the slight depth of water near the city. The building of this wharf would very much increase the mercantile importance of the port of Matanzas, and its cost could be easily reimbursed by the collection of very light dues upon merchandise unloaded thereon.

Dredging of the entrance channel to the bay of Cardenas. In the report of the engineer of the province of Matanzas may be seen the plans and reports of this survey.

San Luis bridge over the San Juan River at Matanzas, to take the place of another that a freshet in the river destroyed.

Drainage of the districts liable to inundations at El Roque and Recreo. These districts are subject to inundations that destroy a rich sugar region.

#### PROVINCE OF SANTA CLARA.

The continuation of the roads being built from Caunao to Manicaragua, from Placetas to Sancti Spiritus, and from Casilda to Trinidad. The building of a road from Santa Clara to Caibarian, passing through Camajuani and Remedios. Of a road from Placetas to Trinidad, passing through Guaracabulla, Baez, Fomento, and Sopimpa. Of one from Manicaragua to Sopimpa, passing through Guinia de Miranda. Throughout this large territory of Santa Clara reconstruction has been very slow in consequence of the complete lack of means of communication. Dredging the bay of Cienfuegos and the mouth of the river Damuji to the same bay. This latter river may be made navigable as far as Rodas by vessels drawing 12 feet of water. Prior to the war there used to be transported by the river to the bay of Cienfuegos some 70,000 tons of sugar annually. The river Manati is navigable for about 12 miles from its mouth, but it is obstructed with sediment, requiring to be dredged at once. It is of great importance and necessity, as it is the only means of shipping existing products at present from the valley of Trinidad.

## PROVINCE OF PUERTO PRINCIPE.

In this province the main attention has been given to the rebuilding of the old bridges that were destroyed during the war, and to the building of new ones whereby the roads at all times excepting rare occasions are made passable, with more or less trouble. The road from the capital to Santa Cruz del Sur is absolutely necessary for the development of agricultural interests in that rich region, as, there being no appropriate means for the transportation of products, their growth is not developed; the length of this road is 92 kilometers, of which only 76 would have to be completely built. The road from the capital to port of Nuevitas is to-day a necessity in view of the monopoly established by the railroad that connects both points, and which, instead of developing, has been the cause of the backwardness and even still prevents the development of that region; its length is 80 kilometers.

The road leading to Santiago de Cuba is also of great importance on account of the great density of population and the greater number of cattle-breeding properties; this district should have a direct outlet to the port of Nuevitas from Guaimaro, passing through or near San Jose, Desmayo, and Redonda; this road would be of great use to the said district, and although it does not figure in the general plan, is not less important than those therein mentioned; its length is 70 kilometers and in time it might be prolonged as far as Guayabal on the south coast, thus opening a new shipping port to the province.

The work of draining the town of Minas is of great importance, which was commenced by American military officers and will be continued to the finish by this department.

## SANTIAGO DE CUBA.

The dredging of the bay. Opening a channel of 25 feet depth in front of the city to allow vessels of deep draft to come to the wharfs is a great necessity, as is likewise the dredging of Punta Gorda and Punta Diamante in the same bay. The wharfs of Gibara and Baracoa have completely disappeared and their rebuilding is urgently demanded. The first will cost in the neighborhood of \$60,000 and the latter \$12,000.

The building of three turnpikes would be of great advantage to the province. First, that from Santiago de Cuba to Holguin; second, from Santiago de Cuba to Bayamo, and third, from Santiago de Cuba to Guantanamo. The distances and estimates of same are to be found in the tables of the general plan.

As to the section of turnpike from Bayamo to Manzanillo I am of the opinion that its building at the present time would be injudicious on account of the work and the high cost of its preservation, and in place thereof I recommend the building of a railroad between the same points in accordance with the project presented to the superior authorities. The foregoing recommendations do not point out all the work that should be done in the island, but only that which deserves special attention at the present time; frequently special circumstances arise that demand the prompt attention of the department to some work not mentioned and the building of which is necessary, and with regard to such it is not possible to make any recommendation at the present time.

## APPENDIX A.

*Statement of the engineering instruments and attachments purchased by the Department during the six months ending on June 30 last, cost of the same in the United States, and cost delivered in this island.*

[American gold.]

CLASS OF INSTRUMENTS PURCHASED BY THE GENERAL DIRECTOR.	Values—	
	In the United States.	In Cuba.
Levels .....	\$2, 296. 00	\$2, 995. 51
Level sights .....		
Metallic tapes, 20 meters .....		
Meter measures .....		
Chains, 20 meters .....		
Locke's hand levels .....		
Abrey's chronometers .....		
Transits .....	3, 278. 52	4, 301. 44
Tripods .....		
Current measure meters .....		

*Statement of the engineering instruments and attachments purchased by the Department during the six months ending on June 30 last, etc.—Continued.*

	Value—	
	In the United States.	In Cuba.
PURCHASED BY THE CHIEF OFFICE OF SANTIAGO DE CUBA.		
Gurley transit, with tripod, plumb bob, etc .....		\$515.00
Gurley level .....		
Level sights .....		
Level sights .....		
U. S. G. S. model, plane tables .....		
Hand level .....		
Chains, 20 meters .....		
Metallic tape, 25 meters .....		7,811.95
Metallic tape, 100 meters .....		
Total cost .....		

NOTE.—In this total are included freights, hauling, custom-house duties, etc.

## APPENDIX B.

No. 220.

HEADQUARTERS DIVISION OF CUBA,  
*Habana, May 28, 1900.*

For the information and guidance of all concerned, the military governor of Cuba, upon the recommendation of the secretary of public works, directs the publication of the following regulations for the government of the department of public works, and all provisions, orders, or laws, or parts thereof, in conflict with these regulations are hereby revoked.

J. B. HICKEY,  
*Assistant Adjutant-General.*

### REGULATIONS FOR THE GOVERNMENT OF THE DEPARTMENT OF PUBLIC WORKS.

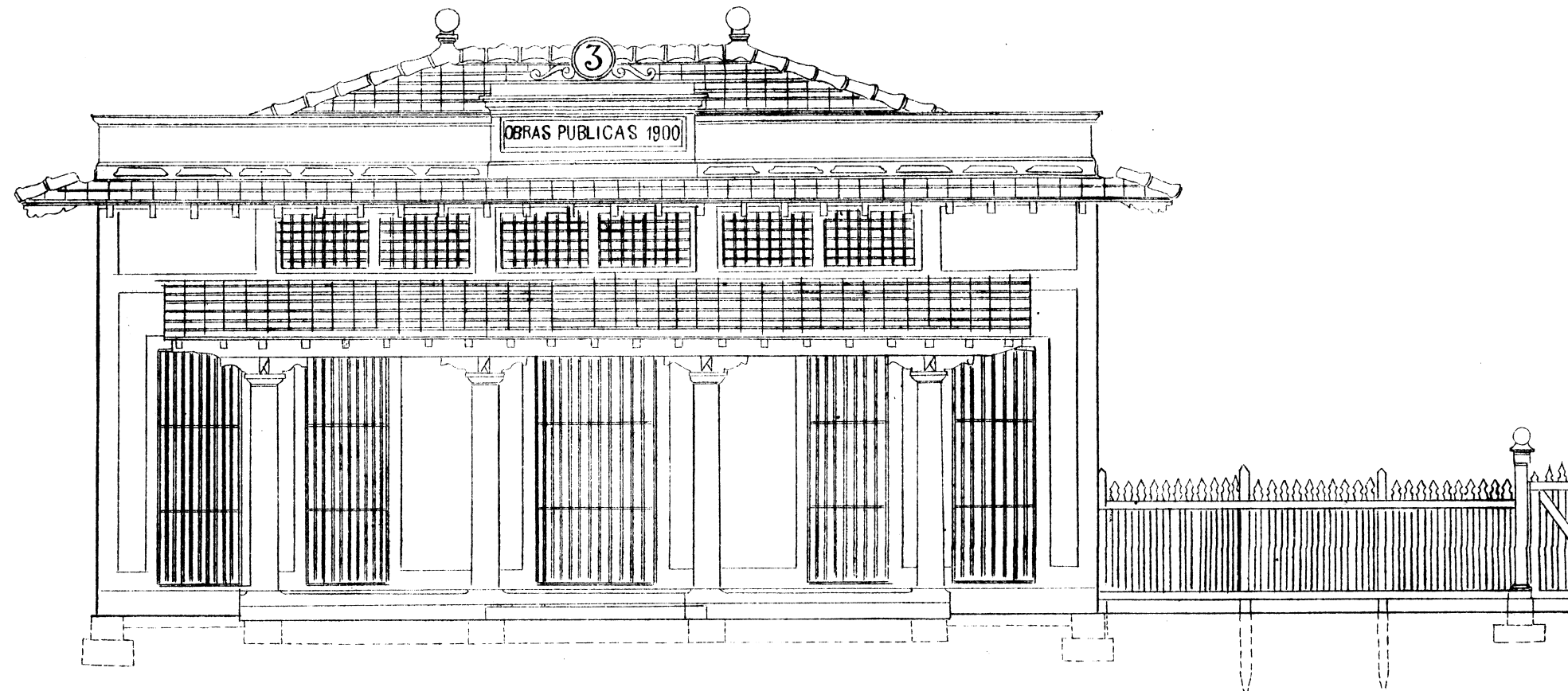
Par. 1. The department of public works shall consist of a secretary, a director-general, and such number of district engineers and of other employees as the nature and extent of the works in hand may require and as may be authorized from time to time by higher authority.

Par. 2. The secretary of public works shall have his headquarters at the seat of government, and shall be charged, under the direction of the governor of the island, with the control of the department of public works, and with the regulation of the duties of all persons who may be employed by the department. By virtue of this authority he directs the affairs of the department, and gives such orders to all individuals connected therewith as the necessities of the service demand.

Par. 3. He shall supervise all disbursements made by officials of the department, and his approval of their accounts, so far as relates to the necessity or expediency of the expenditure and the prices paid, and his certificate that the mode of expenditure adopted, under the laws and regulations from higher authority, was the most economical and advantageous to the Government, shall be final. If the disbursing official certifies that the mode of expenditure adopted was the most economical and advantageous to the Government, the certificate of the secretary of public works to that effect may be omitted, and will be covered by the approval of the secretary of public works indorsed on the account current.

Par. 4. Public funds for the use of the department of public works shall be obtained from the treasurer of the island on requisitions from the secretary of public works approved by the governor. Such requisitions shall state the amount desired, the appropriation from which it comes, the depository or depositories in which the money shall be placed, and the name of each official to whose credit it is to be deposited.

Par. 5. The secretary of public works will see that the funds in the hands of a disbursing officer are limited to his requirements for a brief period, and that as much as practicable of public moneys placed to his credit is kept with the treasurer of the island, or with a designated depository of public funds.



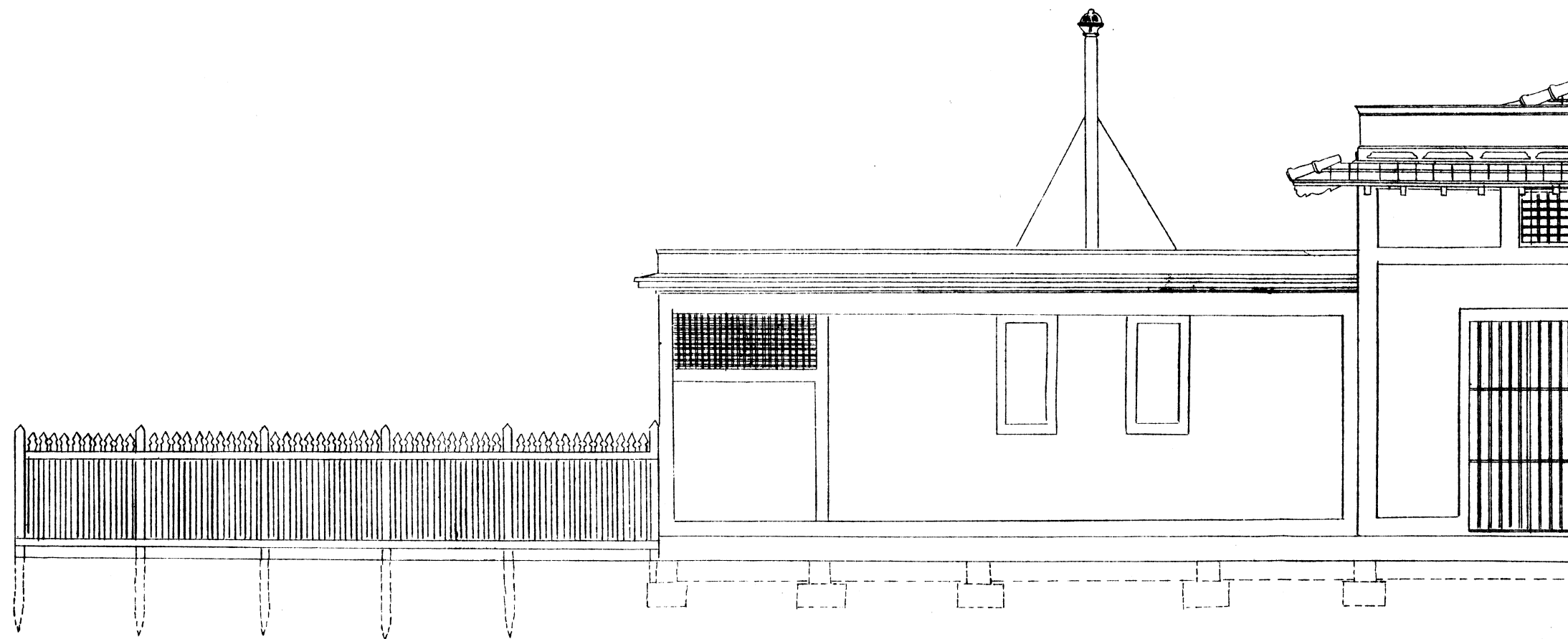
FACHADA PRINCIPAL

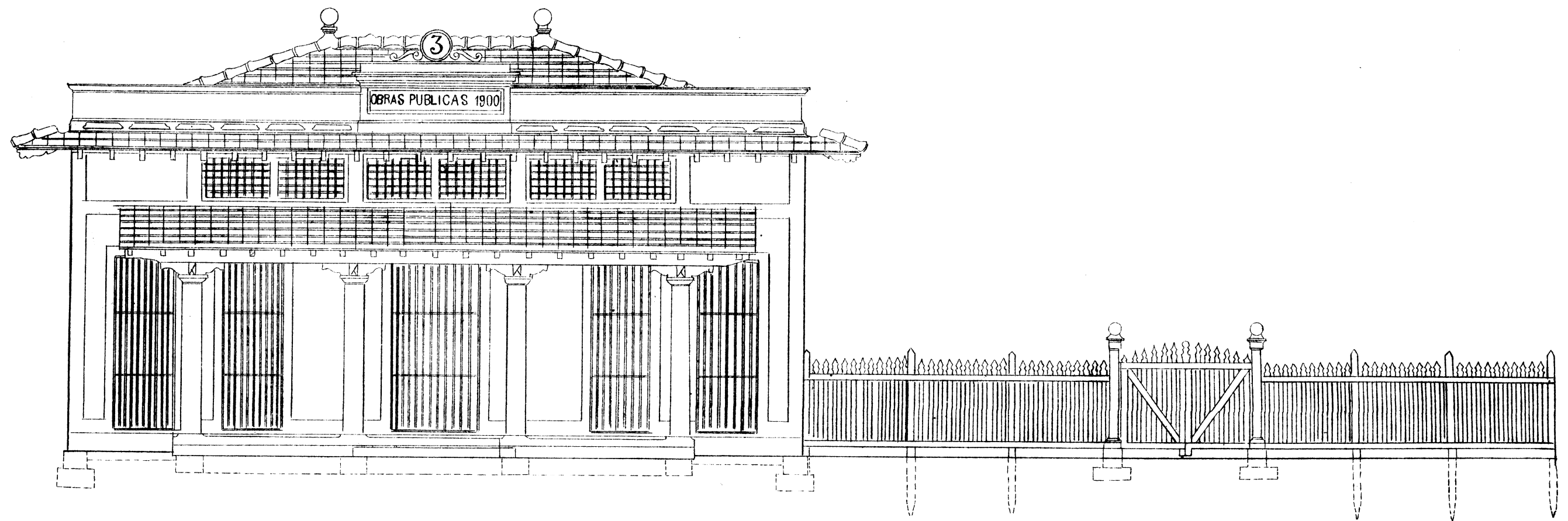
DEPARTAMENTO DE OBRAS PUBLICAS  
CONSTRUCCIONES CIVILES

PROYECTO DE CASILLAS PARA

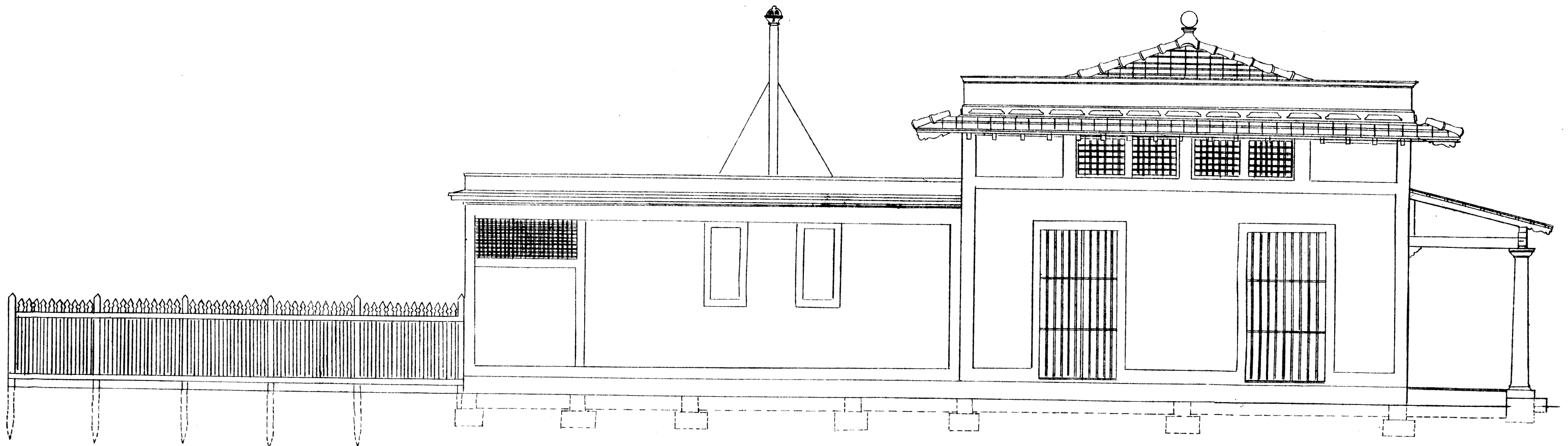
*Peones Camperos*

Escalade Omb2po Mº



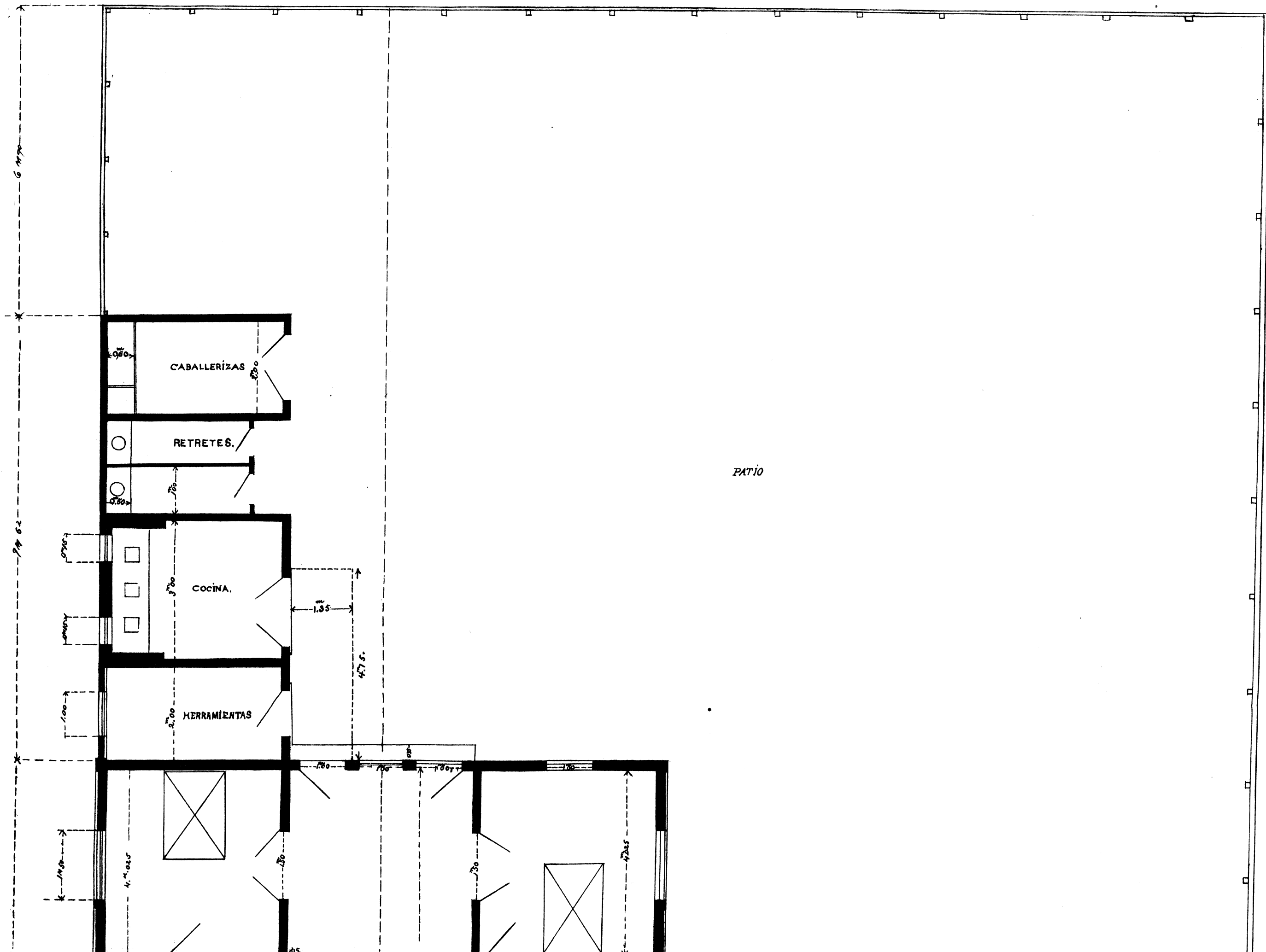


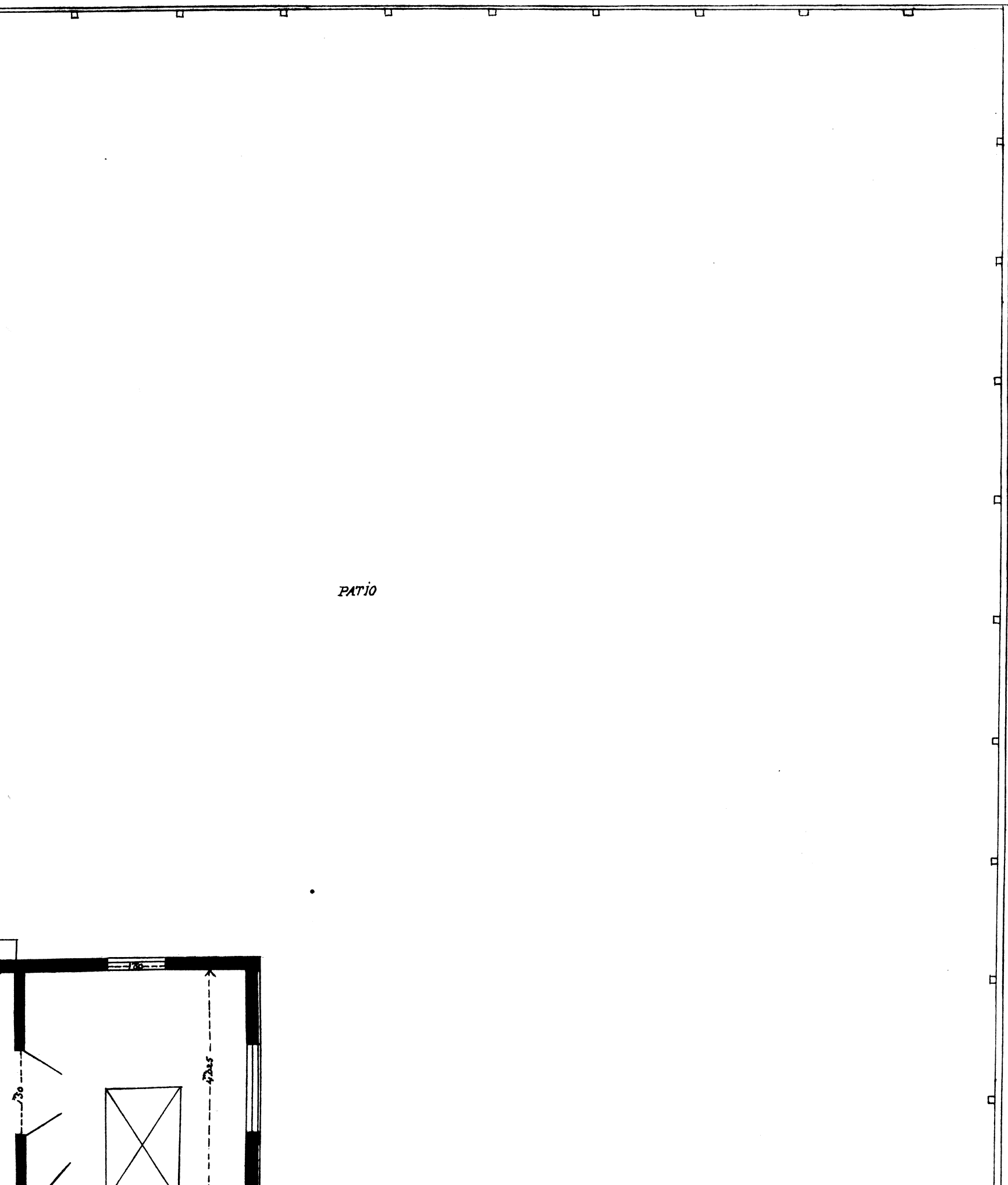
FACHADA PRINCIPAL



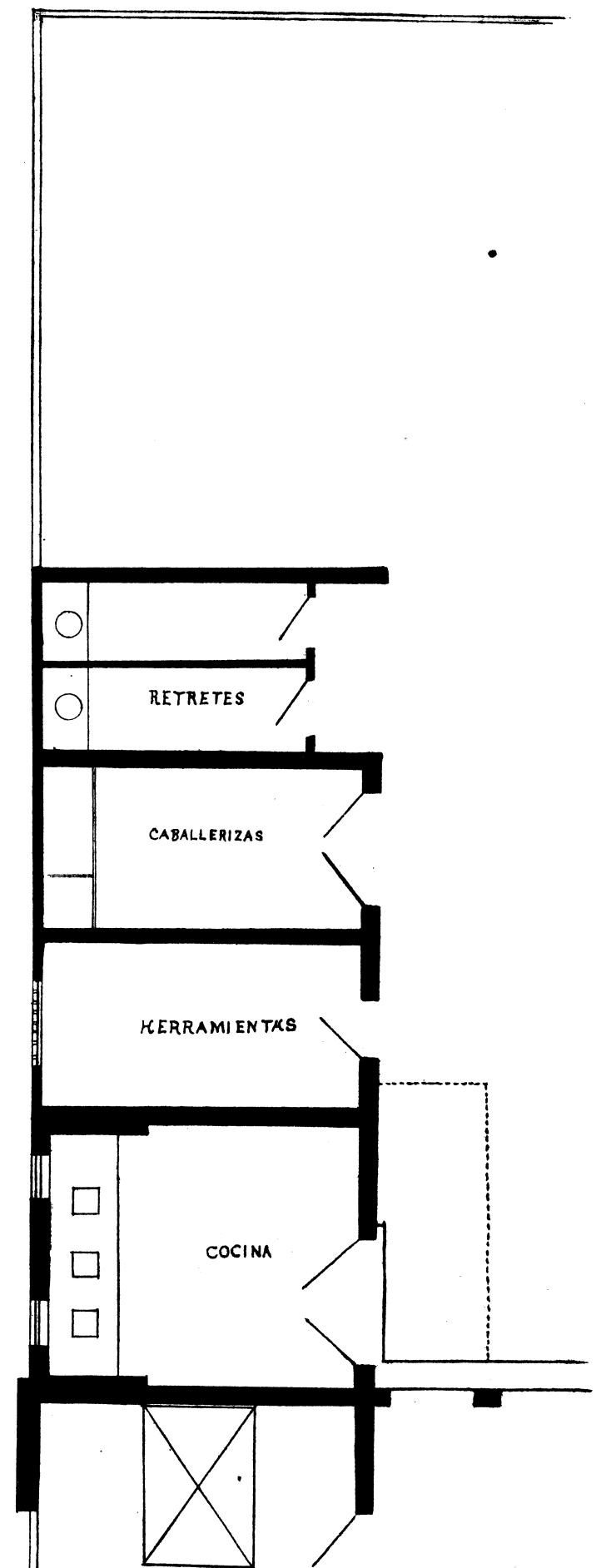
FACHADA LATERAL







CERCA.

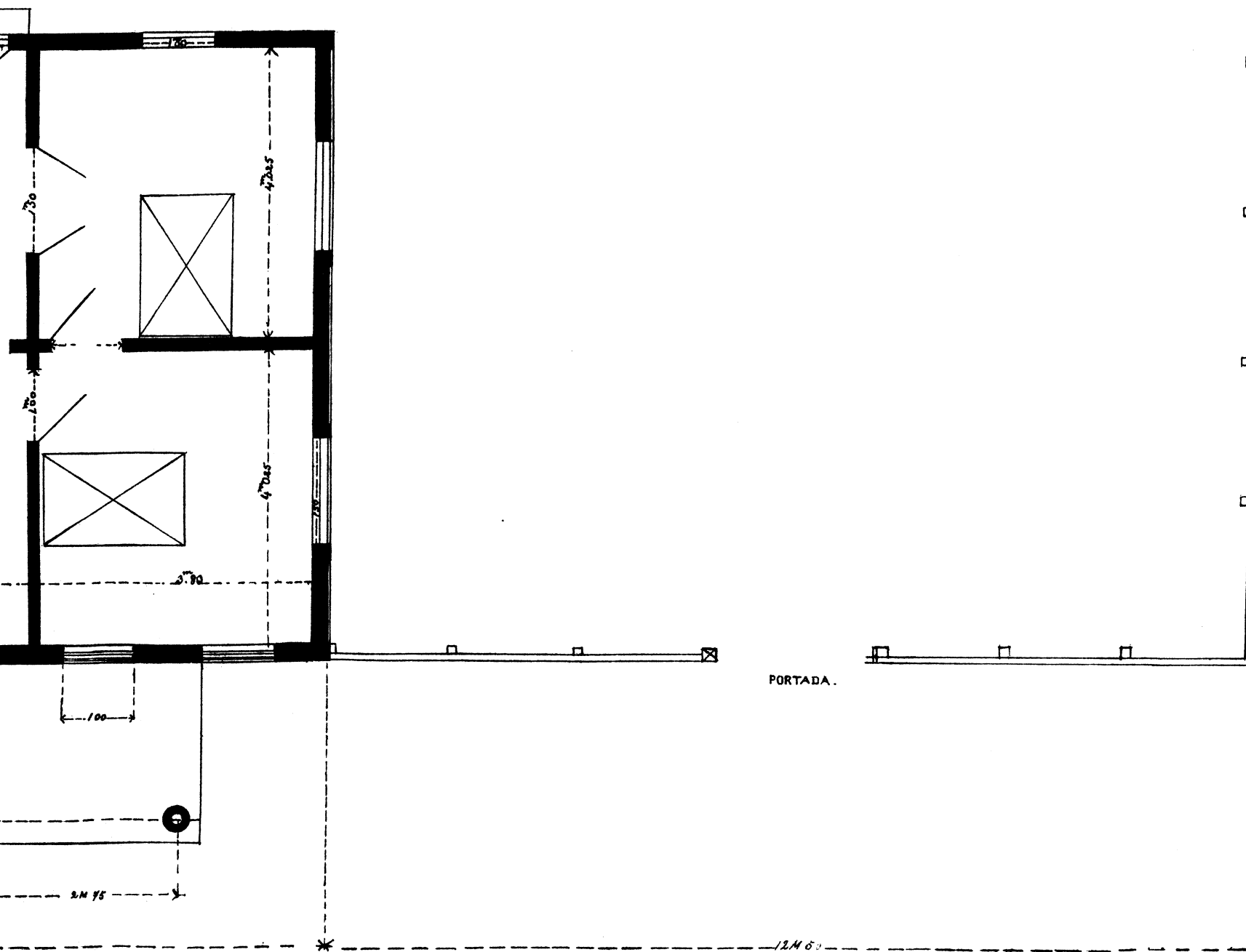






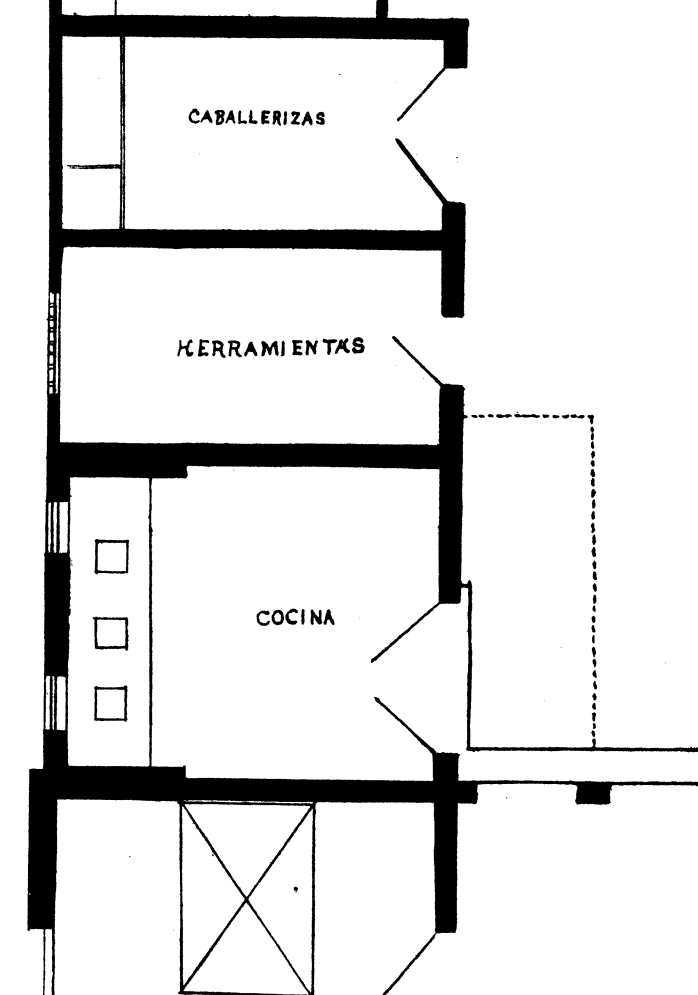
— CASILLA PARA PEON CAMINERO —

PATIO



MINERO —

CERCA.



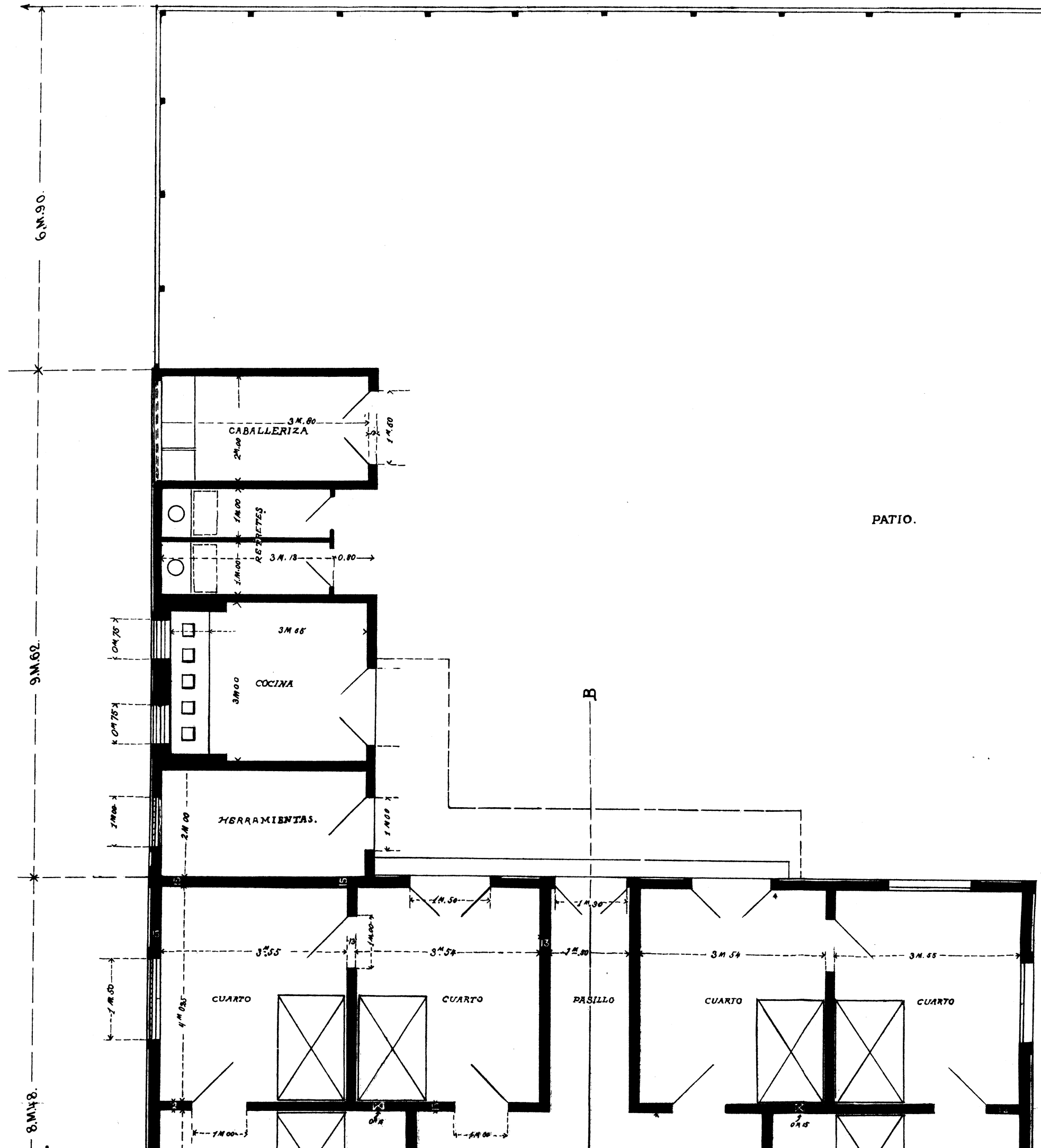
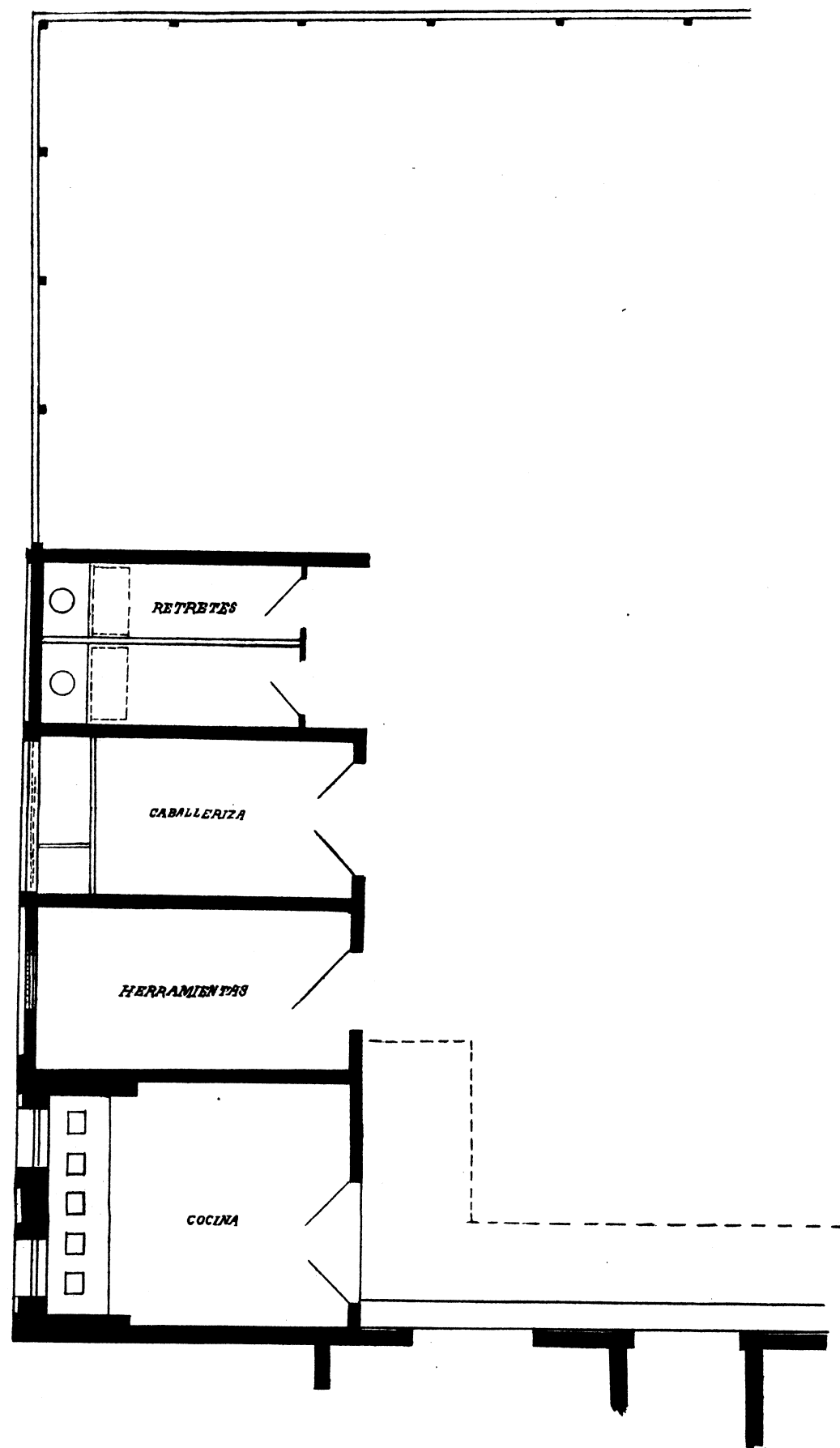
DEPARTAMENTO DE OBRAS PUBLICAS  
CONSTRUCCIONES CIVILES

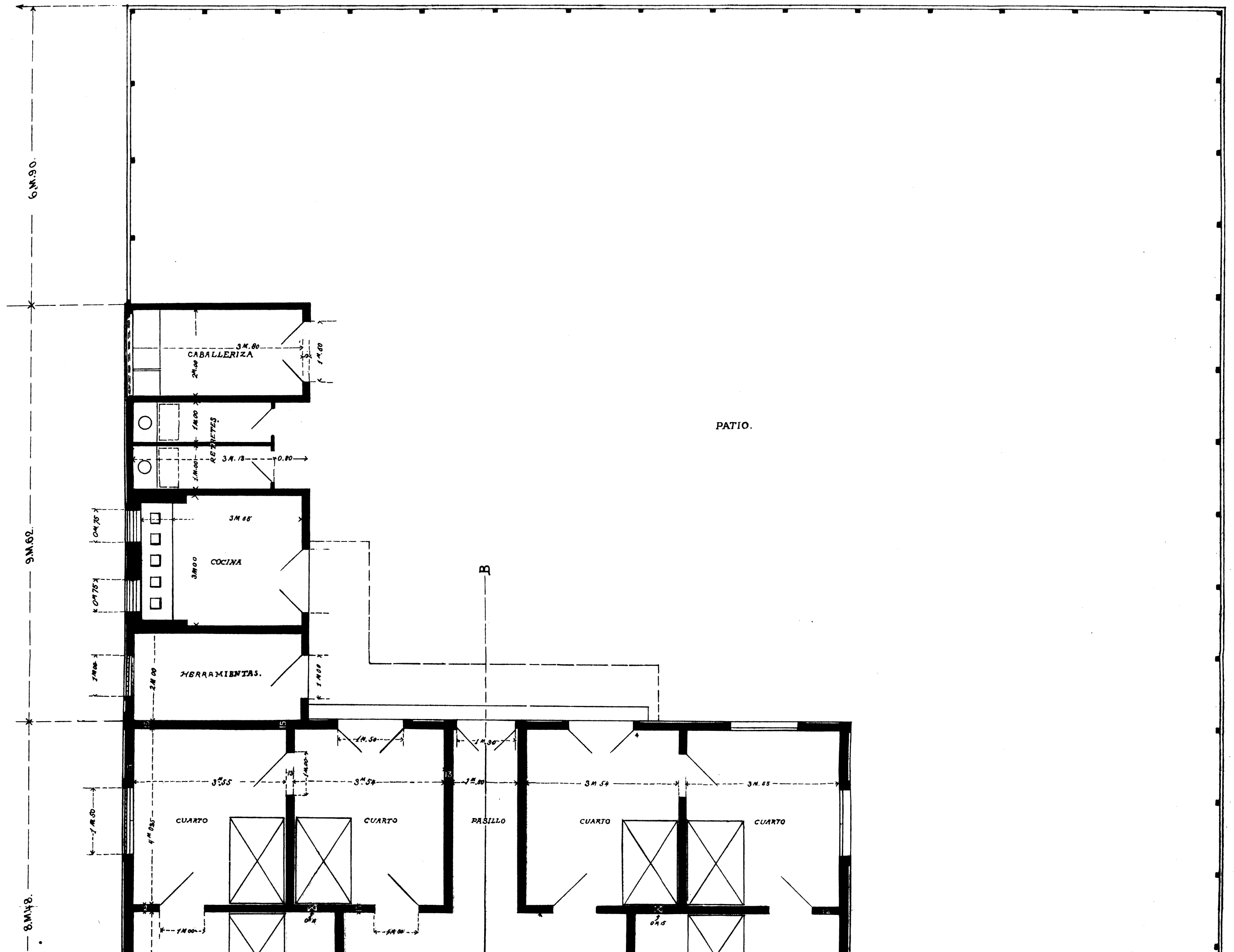
PROYECTO DE CASILLAS PARA  
Peones Campesinos

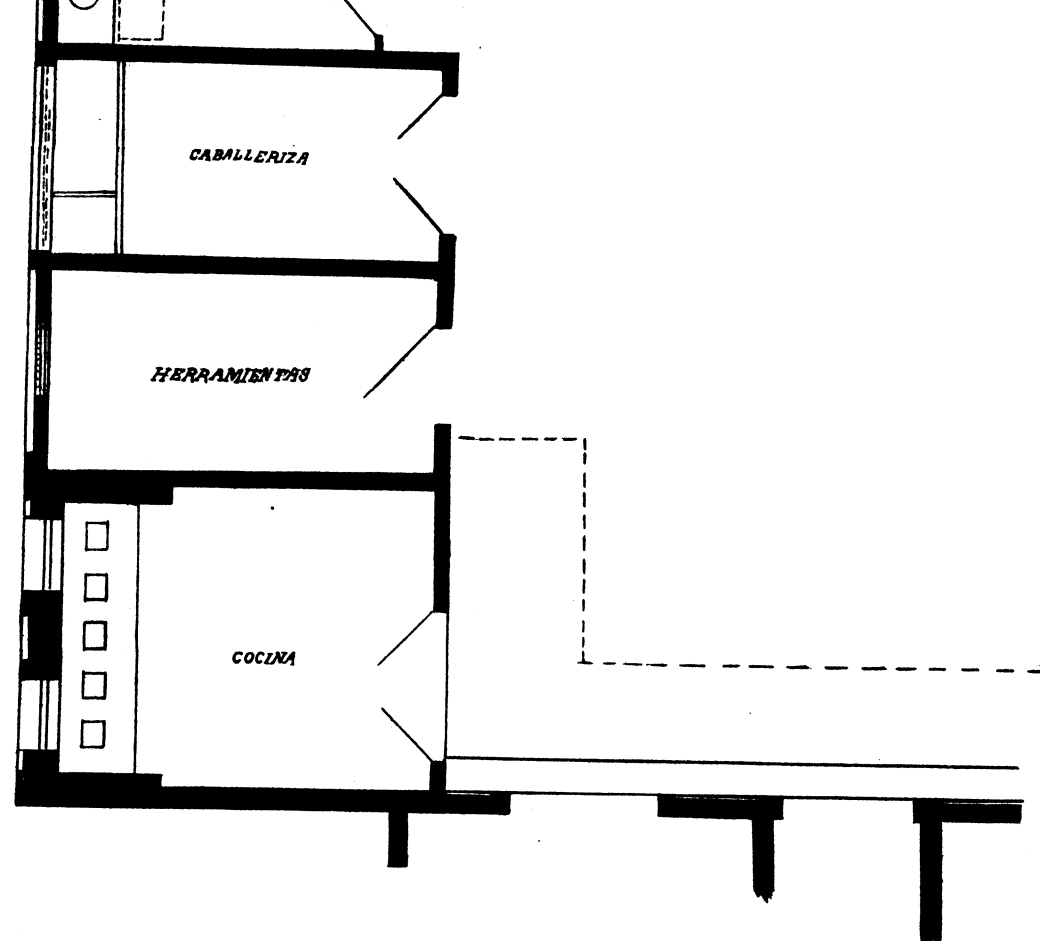
Escala de 0"=2 por M<sup>2</sup>

Costo de construcción - ladrillo - \$ 2100







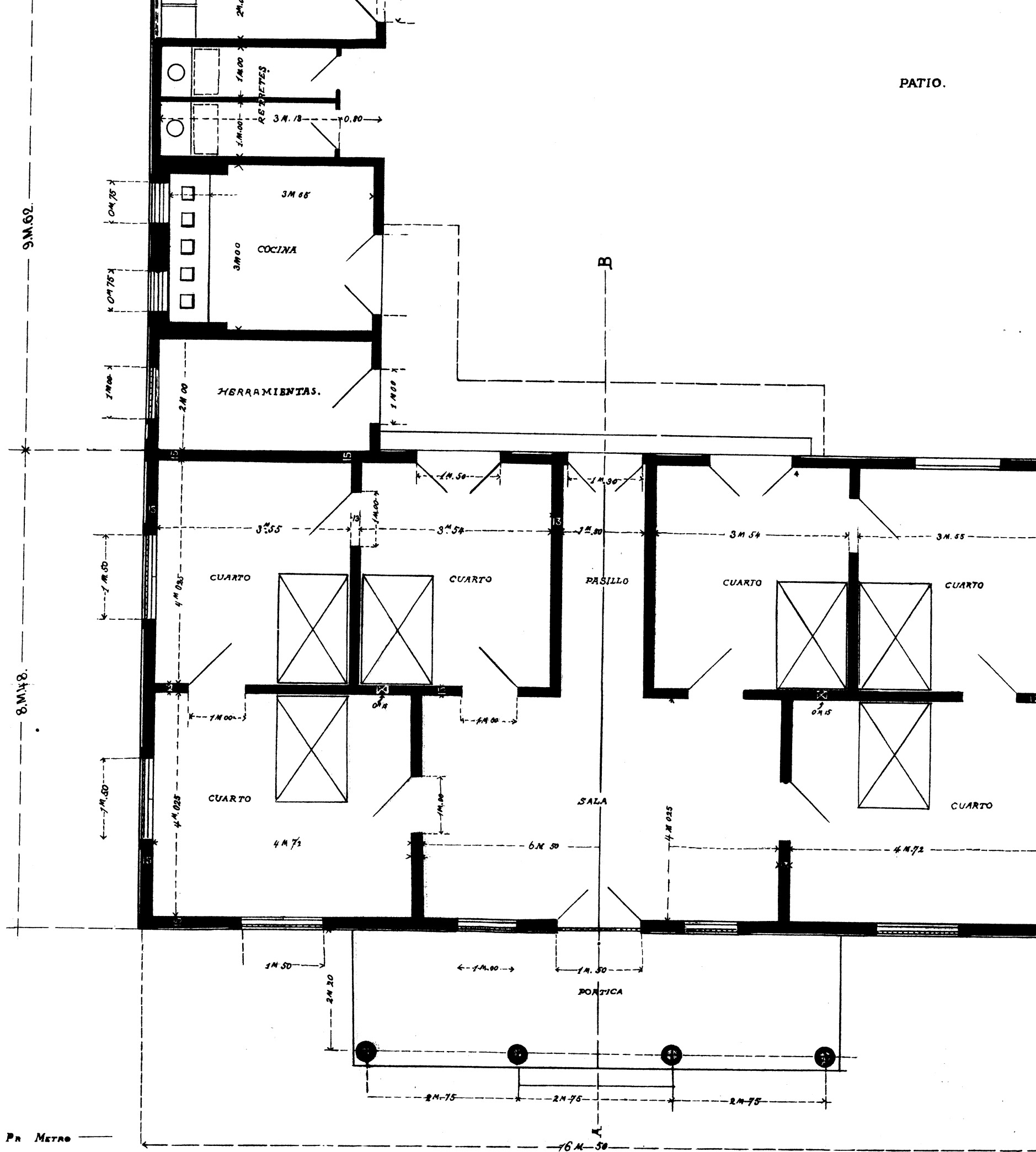


DEPARTAMENTO DE OBRAS PUBLICAS  
CONSTRUCCIONES CIVILES  
PROYECTO DE CASILLAS PARA  
CAPATAZ

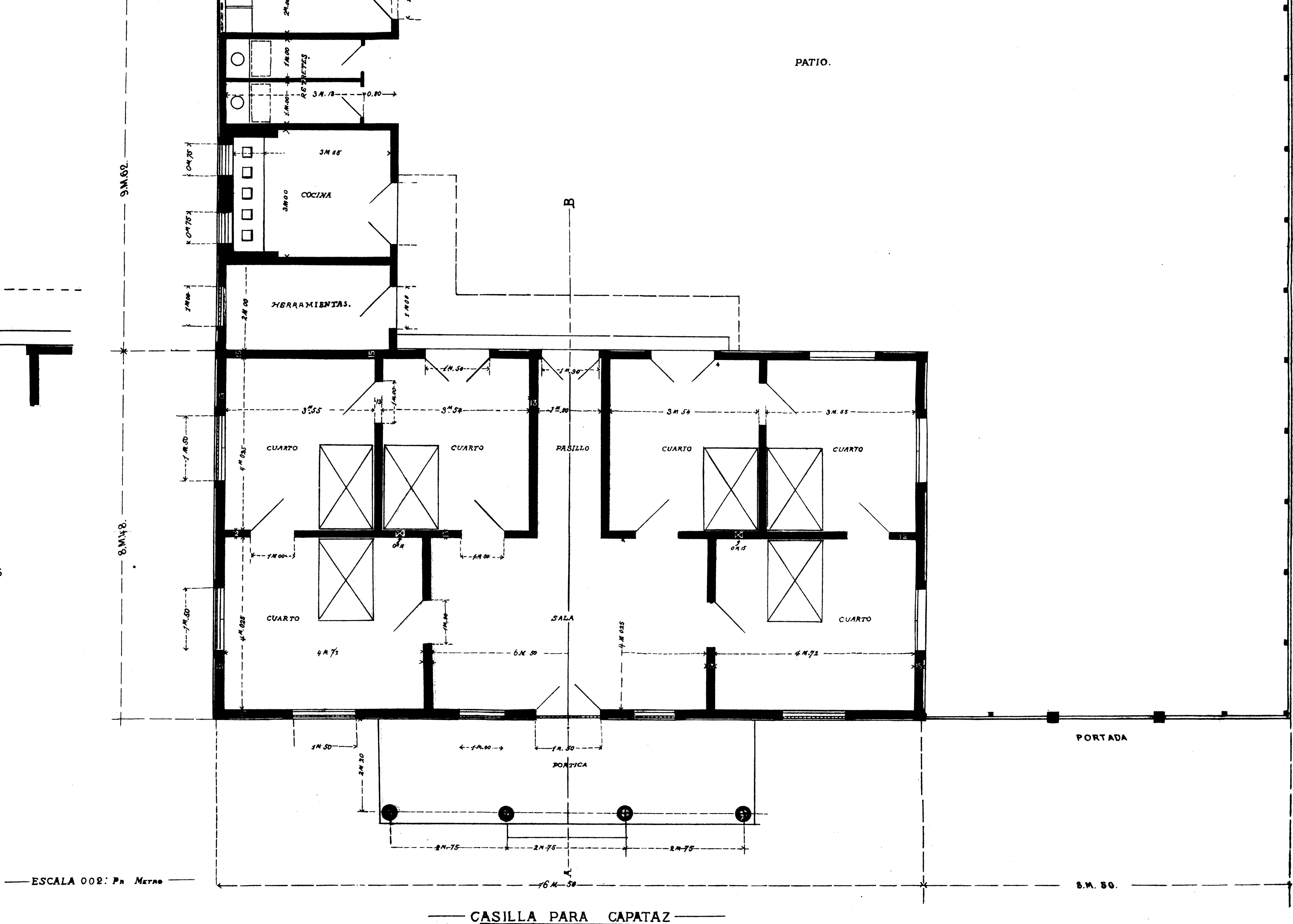
Escala de 0"=2 por M.

Costo de construcción - ladrillo - \$ 2,500.

— ESCALA 002: Por Metro —



— CASILLA PARA CAPATAZ —







Par. 6. The secretary of public works will cause each account current with its accompanying papers to be examined and transmitted to the auditor for the island with his decision indorsed thereon within ten days from the date on which such account was received at his office. He will bring to the notice of the governor of the island all matters of account that require or merit it. When a suspension or disallowance is made the secretary will notify the official held responsible, that he may have opportunity to submit explanations or take an appeal to the governor.

Par. 7. As soon as possible after the receipt of a property return by the secretary of public works, it will be examined in his office, and the official making the return will be notified of all errors and irregularities found therein and granted three months to correct them. Suspensions or disallowances will not be made on account of slight informalities which do not affect the validity of a voucher, but the official's attention may be called to them. Whenever the errors have been corrected or compensation has been made for deficient articles, the return will be regarded as settled, and the official who rendered it will be notified accordingly.

Par. 8. If the necessary corrections in the return be not made within the prescribed time, the facts will be reported to the governor. When it has been determined that the money value of the property for which an officer has failed to account shall be refunded to the government, the facts will be certified to the auditor for the island by the secretary of public works.

Par. 9. The secretary of public works shall present to the governor of the island, on or before the 1st day of September in each year, a report of the operations of the department for the year ending on the 30th day of June preceding, with such suggestions relative to its affairs as he may deem expedient, accompanied by an estimate of funds required for the service of the department for the ensuing year.

Par. 10. The secretary of public works shall from time to time personally inspect the public works under the charge of his department, under the authority of the governor of the island.

Par. 11. The secretary of public works shall determine the extent of office room and furniture therefor required for employees of his department when the expenditure is to be made from appropriations controlled by the department.

Par. 12. The director-general of public works shall be the principal assistant of the secretary of public works. He shall act as secretary of public works in the event of death or disability of the secretary, or of his absence from the seat of government, provided, however, that in the event of the disability of the secretary, or his absence from the seat of government, written authority must be given by the governor of the island to enable the director-general to act as secretary. The director-general of public works shall be ex officio chief inspector of railways, and shall perform such other duties as may be assigned him from time to time by the secretary.

Par. 13. There shall be attached to the headquarters of the secretary of public works as many officials as the service of his department may require, and through whom the secretary may issue orders and instructions.

Par. 14. There shall be such a number of district engineers as the service of the department may demand, and as authorized by the governor of the island. Each district engineer shall have his office in a convenient locality, within the limits of the district assigned to him. District engineers shall be charged with the preparation and execution of projects for work in their respective districts. They will be held responsible for all public property pertaining to the department and in their charge, and for the proper expenditure of all public funds for works in their charge as regards the objects of the expenditure, the prices paid, and the method of expenditure adopted under the regulations from higher authority; and will render such accounts and returns as may be required. Each district engineer will file with the treasurer of the island a suitable bond, in an amount to be fixed by the governor of the island, on the recommendation of the secretary of public works and of the secretary of finance.

Par. 15. There will be attached to the office of the secretary of public works and to the office of each district engineer one chief clerk, who, in addition to the other duties assigned to him by his superiors, shall be the disbursing officer for that office. He shall be held responsible for the care of all public funds committed to his charge, and for their disbursement, under the orders of his immediate superior in accordance with the adopted rules and regulations, in so far as regards the amounts paid and the identity of the payee. He shall file a suitable bond with the treasurer of the island, in an amount to be fixed by the governor of the island, on the recommendation of the secretary of public works and the secretary of finance.

Par. 16. All projects for commencing new works must be submitted to the governor of the island, through the secretary of public works, for consideration.

Par. 17. When plans of any kind for public work under the department of public works have been approved by the governor of the island, or by the secretary of public

works, they must not be departed from in any particular without the express permission of the approving official.

Par. 18. Public works in charge of the department of public works shall be inspected at least once a year, and when completed by such officials of the department as the secretary of public works, with the approval of the governor, shall designate.

Par. 19. In any work carried on under the direction of the secretary of public works his authority must be obtained for the erection of temporary wharves and buildings required in the progress of the work; for the purchase of surveying instruments, professional books, maps, and charts; of medicines; of means of transportation of surveying parties; for the rent of office room and purchase of furniture for same, and for the purchase or hire of any vessel or boat; and the application for the authority must state the probable cost to be entailed. Extensive repairs upon any wharf, building, vessel, or boat must first be authorized by the secretary of public works. His authority must also be obtained for the employment and rate of compensation of assistant engineers, scientists, physicians, inspectors, draftsmen, clerks, copyists, overseers, steamboat captains, mates, and pilots. When, from the emergency of the work, antecedent authority has not been obtained, approval after the fact may be given by the secretary of public works, at his discretion. In such cases the official making the purchase or procuring the service, in reporting the same to the secretary of public works, shall certify that the emergency of the work was such that the antecedent authority of the secretary of public works could not be obtained.

Par. 20. The repairs of instruments may be made under the direction of the district engineer responsible for them, when the exigencies of the service, in his opinion, require it, and the cost thereof charged to the work on which they are in use.

Par. 21. Journeys to be performed by officials of the department on duty connected with public works may be ordered by the secretary of public works, or approved by him when the emergency requiring the journey does not permit of obtaining an order previous to making the journey. In the latter case the official should certify upon the traveling voucher "that urgent public duty required the journey to be performed without previous orders," and the voucher must be accompanied by the approval of the journey by the secretary of public works, or of the district engineer responsible, if performed by a subordinate of a district engineer.

District engineers are authorized to order journeys made by their subordinates within their respective districts.

Par. 22. Officials of the department of public works traveling under orders on duty connected with the public works will be paid travel expenses from the appropriations for the work for which the journey is required.

Par. 23. The following books and files for each work will be required to be kept by the official in charge: (1) A cashbook, with daily records of receipts and expenditures; (2) an appropriation or allotment book; (3) a roll file, showing the name, occupation, time employed, and amount paid to each hired person each month; (4) a file containing a journal of operations, showing a daily record of the occupation of the persons employed on the work, the application of their labor, and miscellaneous facts connected with the work; with contract work a record of the quantity of work done by the contractor daily, if possible, or at such times as the work can be measured, stating daily the number and occupation of men employed, and number and kind of machines used by contractor; (5) a file of letters sent; (6) a file of letters received; (7) a file of orders received; (8) a press copy book of all vouchers paid; (9) a property file; (10) an index will be kept with each book and file.

Par. 24. The following reports and returns for works of the department shall be sent to the secretary of public works by the engineer in charge within ten days after the expiration of the month or quarter to which they relate, viz: Monthly report of operations monthly return of employees; monthly account current; monthly abstract of disbursements (in duplicate with proper vouchers); monthly abstract of funds received; monthly abstract of funds transferred; monthly abstract of property purchased. The following returns will be rendered on the first day of the month following that to which they relate: Monthly money statement; monthly personal report.

The following return shall be rendered within twenty days after the quarter to which it relates: Quarterly return of public property. Property returns must be rendered for the quarter ending June 30 and December 31 of each year. After a complete return has been furnished, if there have been but few changes during a subsequent quarter, it will be sufficient to state these changes for the quarter ending March 31 and September 30.

Par. 25. A report shall also be sent in time to reach the secretary by the 1st of August of each year of the operations on each work or survey during the fiscal year ending 30th June preceding, with the necessary drawings, and showing the condition

of the work, the extent and cost of the principal operations (as brickwork, stonework, earthwork, surveys), accompanied by a summary statement of expenditures during the year, with a detailed estimate of the funds required for the next year, and an estimate of the amount required to complete the work.

The report should conclude with a recapitulation, giving a brief of its more important facts and interesting particulars; this should be of such a form that it may be embodied in the annual report of the secretary of public works.

Par. 26. An official of the department, or agent, who is in charge of any work of construction or survey, or any operation involving the expenditure of money, shall supervise the disbursement of the money for the same, and when informed of the fund applicable thereto will furnish the secretary of public works a project for the manner in which it is proposed to apply it, with an estimate of the probable monthly expenditures.

#### MONEY ACCOUNTABILITY.

##### *Public moneys.*

Par. 27. The use of moneys for purposes other than those for which appropriated, liquidation of liabilities of one fiscal year by use of moneys appropriated for another, and expenditures in a fiscal year of any sum in excess of appropriations for that year, or involving the government in any contract for future payment of money in excess of appropriations, except as authorized specifically by the governor of the island, are prohibited.

Par. 28. Lists of depositories designated for the use of disbursing officers will be published from time to time in orders.

Par. 29. When an officer disburses money in different capacities his deposits and accounts will be kept distinct, according to the department to which they pertain.

Par. 30. Public moneys subject to disbursement coming into the hands of an official from any source must be promptly placed by him to his credit with an authorized depository, or transferred to a disbursing officer of that branch of the public service to which the money pertains, in either of which cases a receipt will be obtained. Exceptions to this rule are allowed where a disbursing officer has been specially authorized by the governor to keep in his personal possession, at his own risk, the public moneys which have been intrusted to him for disbursement, and money in hand may be disbursed at once without being placed in depositories if payments are due.

Par. 31. A disbursing officer ceasing to act as such, and having public funds to his credit in any office or bank, will at once inform the treasurer of the island, stating what checks drawn against the same are still outstanding and unpaid.

Par. 32. All amounts of money held at the end of each fiscal year by the treasurer, an assistant treasurer, or a designated depository, credited to a disbursing officer whose account has remained unchanged, either by deposit or payment, for the space of one year, shall be covered into the treasury to be placed to the credit of such officer if it is found that he is entitled to the credit.

#### DISBURSING OFFICERS.

Par. 33. No official disbursing public money, or directing the disbursement thereof, shall be concerned individually, directly or indirectly, in the purchase or sale of any article intended for, used by, or pertaining to the department of the public service in which he is engaged.

Par. 34. Officials or agents in the government service will not purchase supplies for the government from any other persons in the service, nor contract with any such person to furnish supplies or services to the government, nor make any government purchase or contract in which such person shall be admitted to share or receive benefit.

Par. 35. If any disbursing officer shall bet at cards or any game of hazard he shall be dismissed.

Par. 36. All funds drawn from the treasury will be placed by the treasurer with the designated depositories to the credit of the person named in the warrant. For each deposit the depository will issue a receipt setting forth its serial number, the place and date of issue, the name of the depositor, amount, and name of the party receiving the credit. The depository will send one copy of this receipt direct to the treasurer and another copy to the party receiving the credit.

Par. 37. When the treasurer deposits funds to the credit of a disbursing officer, he will notify the disbursing officer, stating to what fund and allotment the money belongs.

## TRANSFER OF FUNDS.

Par. 38. Public funds will in general be transferred as follows. The official making the transfer will draw his check, directing the bank to place the said amount to the official credit of the party named therein. This check will be sent to the bank, unless the funds are required for immediate use, in which case the transferring official may draw the check and transmit it direct to the party receiving them. All transfers of funds will be covered by invoices and receipts in duplicate, the invoices stating the allotment or appropriation to which the funds belong. Depositing money to the credit of the treasurer is not a transfer of funds; the treasurer's receipt in this case becomes the voucher.

Par. 39. For every deposit made by one disbursing officer to the official credit of another, a receipt will be given by the bank, setting forth its serial number, the place and date of issue, the amount, names of the depositor and of the party receiving credit. In all cases one copy of this receipt will be sent direct to the party receiving the credit and one copy to the depositor.

Par. 40. Funds will not be transferred from one appropriation for the use of another by borrowing or otherwise.

## CHECKS.

Par. 41. A disbursing officer may draw his official check in favor of himself "or bearer," for making payments not exceeding \$20, to make payments remote from the bank, or to cover a pay roll. In all other cases checks will be made payable to "order" or "bearer," and will be drawn in favor of the person, firm, or corporation to whom the payment is to be made.

Par. 42. Each official check of a disbursing officer must state on its face the object or purpose to which the proceeds are to be applied; such statement may be brief, but must be clear, i. e., "pay roll," adding the place and month; "contract for construction," giving the work, etc. Payment will be refused on all checks when this requirement is disregarded and report of the fact made to the treasurer.

Par. 43. Checks will not be returned to the drawer after payment, but the bank shall furnish the officer with a monthly statement of his official account.

Par. 44. No allowance will be made any disbursing officer for expenses charged for collecting money on checks.

Par. 45. In case of death, resignation, or removal of any disbursing officer, checks previously drawn by him will be paid with funds to his credit, unless such checks have been drawn more than four months before presentation, or fraud is suspected, then only upon being approved by the treasurer.

Par. 46. Disbursing officers requiring cash can arrange to obtain it from the collector most convenient, as provided in paragraph 14, Regulations from office of the Treasurer of the Island of Cuba, June 16, 1899; or instruct the bank to forward it. In the latter case, shipment by express or post-office money order is authorized; if shipped by express, a bill of lading will be issued to cover the same.

## OFFICIAL CHECK BOOKS.

Par. 47. Each disbursing officer will make application to the treasurer for an official check book.

Par. 48. The bank will refuse disbursing officer's checks unless drawn on these blanks.

Par. 49. A disbursing officer in opening his first account will furnish the bank with his official signature duly verified by some government official whose signature is known to the bank.

Par. 50. The treasurer will keep a record of all blanks issued, and all unused checks will be returned to him. A disbursing officer transferring any blank checks will take a receipt for the same and make report to the treasurer, giving the numbers of those transferred and the names of the persons receiving them.

Par. 51. Mutilated official checks will be forwarded to the bank and a record of the date of transmission made on the stub.

## METHOD AND TIME OF DEPOSITS.

Par. 52. Hereafter all disbursing officers of the public funds of the island of Cuba will make their deposits with the official public depository where it will be most convenient, the establishment of which has been announced from the office of the treasurer of the island of Cuba.

Par. 53. All deposits will be made to the credit of the "Treasurer of the island of Cuba."

Par. 54. For each deposit made "a certificate of deposit" in duplicate will be given, giving the serial number, place, date, and amount, and the name and official capacity of the depositor. The original of the certificate of the deposit will be at once forwarded by the bank to the treasurer of the island of Cuba, at Habana, Cuba, and the duplicate will be given to the depositor, who will, upon verification, send it to the treasurer.

Par. 55. All moneys will be deposited identically as collected; each deposit to be accompanied by a deposit slip (No. 104), setting forth the amount of United States funds, the amount of Spanish gold, and the amount of Spanish silver, also the month or months in which such funds were collected, noting the exact amount for each month; which information must be given on the original certificate of deposit.

Par. 56. Each duplicate certificate of deposit forwarded to the treasurer by the depositor will contain a statement showing distinctly the source from which the money was derived:

1. If a balance of funds for disbursement, the appropriation and fiscal year will be correctly named.

2. If in refundment of an overpayment, when, by whom, and upon what voucher the overpayment was made.

3. If from stoppages on pay rolls on account of or damage to property by employees or on account of sales to them, for which property the depositing official is himself responsible, the character of the property and the date of loss or sale will be given and a reference made to the official's property voucher accounting for the same.

4. If from stoppage on account of loss, damage, or sale of property for which an official other than the depositing official is responsible, the name of the responsible official will be given, with a list of persons from whom deductions were made, stating character of property and amount deducted in each case.

Par. 57. Upon receipt of the original certificate of deposit the treasurer will issue receipts in duplicate in favor of the depositor.

The number, date, and amount of the certificate of deposit, together with the specific appropriation, if named, will be noted on the account current upon which the depositor desires to be credited with the money deposited. Certificates of deposit will not be filed with accounts current. Officials will state in such accounts dates of deposits and name and location of depository.

Par. 58. Certificates of deposit must be recorded in the office of the secretary of public works. The originals upon their receipt at the treasury are immediately forwarded to the secretary of public works, who refers them to the proper bureaus to which the deposits pertain, for verification and designation of the appropriation.

#### PROCEEDS OF SALES.

Par. 59. The proceeds of sales of public property, as authorized by paragraphs 120 and 126, shall be deposited promptly to the credit of the treasurer of the island and by him placed to the credit of the appropriation for the work from which they were derived, to be available for requisition on estimates in addition to the regular appropriation, if needed.

Par. 60. The transfer of public property from one bureau or department to another is not regarded as a sale. If money is received therefor it may be used to replace such stores, and will be reported accordingly.

#### ACCOUNTS.

Par. 61. All persons who are charged with the safe-keeping, transfer, or disbursement of the public moneys shall keep an accurate entry of each sum received and of each payment or transfer, and shall render distinct accounts of the application thereof according to the appropriation under which the moneys may have been advanced to them. Every person who, having received public money which he is not authorized to retain as salary, pay, or emolument, fails to render his accounts for the same shall be deemed guilty of embezzlement, and shall be fined in a sum equal to the amount of the money embezzled, and shall be imprisoned not less than six months nor more than ten years.

Par. 62. Each official or agent of the department of public works who receives public money which he is not authorized to retain as salary, pay, or emolument shall render his accounts monthly. Such accounts, with the vouchers necessary to the correct and prompt settlement thereof, shall be sent by mail or otherwise to the office of the secretary of public works within ten days after the expiration of each successive month, and after examination they shall be passed to the proper accounting officer of the treasury for settlement.

Par. 63. Irregularities in the mail service, or want of blank forms, have no bearing upon the rendition of money accounts within the time prescribed by the foregoing

sections, and disbursing officers are required to have their accounts ready to be forwarded and deposited in the post-office, at places where such offices are established, on or before the tenth day of each month. If printed blanks are not furnished the forms must be ruled to correspond.

Par. 64. A separate account shall be kept with each appropriation disbursed. The forms of account current and abstract prepared for this purpose will be used by disbursing officers. The blanks will be procured from the secretary of public works. Accounts current will be made in triplicate; two copies, accompanied by two sets of abstracts and one set of vouchers complete, to be forwarded to the secretary of public works within ten days after the end of the month; the other copy, also accompanied by abstracts and vouchers, to be retained by the officer.

Original vouchers will, if possible, accompany the account. Copies will not be accepted unless duly certified and accompanied by satisfactory evidence of the loss or destruction of the originals, or that their retention is indispensable to the performance of duty.

With the account will be forwarded all orders of commanding officers and all other papers upon which the official accountable relies to relieve himself from responsibility.

Par. 65. When vouchers are not sent with the account to which they belong, an explanation must be made as to why they were not produced with and included in the proper account.

Par. 66. An error made in an account must be corrected in the next account current of the official after he is informed of the error, and reference will be made therein to the particular voucher in which the error occurred.

Par. 67. In notifying officials of remittances the secretary of public works will inform them of the amount remitted under each head of appropriation. All officials who make transfers of public funds will pursue a similar course, stating in the invoices and receipts the amount transferred from each appropriation. In the letters notifying officials of remittances the secretary of public works, in addition to the amount of each appropriation, will give the titles of appropriations to be used in accounts current, abstracts, and vouchers.

Par. 68. Funds received from overpayments previously made will be entered on the account current in the proper column. The entries should show by whom and to whom the overpayments were made, on what account, and refer to the voucher (and abstract).

Par. 69. Funds received from sales will be entered in the proper column on the account current, and will show the fiscal year in which the articles were purchased, if known.

Par. 70. Whenever money is refunded to the treasury the name of the person refunding and the purpose for which it is done must be stated.

Par. 71. Receipts for funds disbursed and receipts and invoices of funds transferred will state the place and date of payment or transfer, the name and title of the official from whom the money is received.

Par. 72. Disbursing officers will promptly, at the close of business at the end of each month, make and forward statements showing explicitly where their funds are deposited. Officials will include in the sums claimed to be on deposit only such funds as have been officially credited to them, and of which credit they have been duly informed by the depository.

Par. 73. When an official is relieved from duty on any work he shall certify the outstanding debts to his successor, and transmit an account of the same to the secretary of public works. Unless otherwise ordered he will turn over the public money and property and the books and papers appertaining to the service from which he is relieved to his successor.

Par. 74. No official has authority to insure public money or property. Disbursing officers are not authorized to settle with heirs, executors, or administrators except by instructions and approval from the secretary of public works.

#### VOUCHERS.

Par. 75. When disbursing officers draw checks in payment of accounts on funds placed to their credit with depositaries, they will note upon the receipt taken for such payment the number, date, and amount of the check given in payment, and designate the depository upon which it is drawn; and when an account is paid in part by currency the amount of the same will be stated. The same rule will be observed in regard to invoices of funds transferred.

Par. 76. In all cases of contracts for the performance of any service or the delivery of articles of any description for the use of the government, payment shall not exceed the value of the service rendered or of the articles delivered previous to the payment.

Par. 77. Vouchers will be made in duplicate or, if required, in triplicate, and the number made will be stated on each copy.

Par. 78. The correctness of the facts stated on a voucher and the justness of the account must be certified to by the district engineer.

Par. 79. Every voucher in support of a payment for supplies or for services other than by the day or month, whether it be made pursuant to a formally prepared contract, an accepted bid, or a purchase without advertising (unless it comes within the excepted cases provided for in the following paragraph), must have attached to it an original bill furnished by the creditor, dated and signed by him or his authorized representative, giving his place of business or residence, and stating (if for supplies furnished) the date of the purchase, the quantity and price of each article, and the amount, or (if for services other than by the day or month) the character of the services, the date or dates on which rendered, and the amount. A voucher so accompanied will be made out in favor of the creditor, giving his address, and may state the account in general terms, with the aggregate amount only extended, and the words "as per bill hereto attached," or words of like import, added. Where papers relating to two or more vouchers are required to accompany accounts, they must be filed with the first voucher paid, and reference thereto made on the other vouchers. A voucher for services by the day or month must state the nature of the service, the inclusive dates of service, the time for which payment is made, the rate of pay, and the amount. When the vouchers are for emergency purchases or services, they will state that the price paid was the lowest market rate, and that the mode of expenditure adopted was the most economical and advantageous to the government.

Par. 80. When a creditor is unable for any cause to make out his bill or to have it made out, the disbursing officer must set forth on the voucher all the details of the account, as required for the bill by the preceding paragraph, and must give reasons in full on the voucher why a bill is not furnished. Original bills need not be attached to vouchers in the following cases, viz: Where, under contract, quantities delivered or amounts due are determined by a duly authorized inspector, and his certificate as to the facts is filed with the voucher to which it pertains; where a bill of lading or transportation request accompanies a voucher for transportation services performed under public tariffs; where a voucher is for telegraphic service at fixed rates; where a voucher is for services by the day or month, or where a creditor makes out his bill on a blank form of voucher and certifies to its correctness.

Par. 81. Money amounts will be expressed in terms of dollars and cents. When a fraction of a cent less than one-half occurs in the footing of a voucher, it will be disregarded; if the fraction be one-half or greater, it will be reckoned as a cent.

Par. 82. A voucher for a purchase or for services not personal must have expressed on its face, immediately below the statement of the account, the mode of purchase or engagement, using therefor one of the following notations:

1. Under contract, dated..... 19—
2. Under public notice, dated..... 19—
3. Under oral agreement, without advertising.
4. Under written agreement, with (or without) advertising. If by written agreement, a copy of the agreement must accompany the voucher.

Par. 83. The giving or taking of receipts in blank for public money is prohibited.

Par. 84. A voucher for funds disbursed will, before being signed by a public creditor, be made out in full, with place of payment and the name and title of the paying official entered in the receipt, and the exact amount of money written out in words in the receipt. When vouchers are sent by mail for signature the date in the receipt will be left blank, and the check in payment will not be drawn until the vouchers are returned properly signed, when the date of the check will be added to the receipt.

Par. 85. Invoices of and receipts for funds transferred will state place and date of transfer, the name and title of the officer from whom the money is received, the kind of funds transferred, and the amount transferred under each head of appropriation. If the transfer is for correction of errors, whether arising upon the settlement of accounts or otherwise, the facts will be noted in detail on both invoice and receipt. The receiving officer or agent will indorse upon the invoice the exact date of the receipt given by him and will file it with the account current on which he acknowledges receipt of the funds. Any discrepancy as to the appropriation, fiscal year, or amount which may exist between the invoice and receipt when the latter is properly made out will be noted and explained on both invoice and receipt by the officer or agent receiving and receipting for the funds.

Par. 86. Vouchers for payments made and invoice and receipts for money transferred will have noted upon them the number, date, and amount of checks given, and the depository on which drawn. If payment is made by currency, in part or in whole, the facts will be stated.

Par. 87. Vouchers must be stated in the name of the corporation, company, firm, or person rendering the service or furnishing the articles for which payment is made.

Par. 88. Payments in currency or by check to bearer will not be made to holders of powers of attorney or of instruments operating as transfers or assignments.

Par. 89. If payment in currency or by check to bearer is made to an incorporated or unincorporated company, the money or check must be delivered to and the voucher receipted by a duly authorized official or agent of the company; the receipt must be signed with the company name, followed by the autograph signature of the officer, with his title, or of the agent to whom the money or check was delivered, and the receipted voucher will be accompanied by evidence showing his authority. This evidence will consist of extracts from the articles of incorporation or association, the by-laws, or the minutes of the board of directors, duly certified by the custodian of such records (under the company seal, if there be one), showing that the signer is properly vested with authority to receive and receipt for money due the company.

If payment in currency or by check to bearer is made to an individual or a copartnership doing business under a company title, the receipt must be signed with the company name, followed by the autograph signature of the individual proprietor or of one of the members of the firm, with the words "proprietor" or "one of the proprietors" appended thereto.

If payment in currency or by check to bearer is made to a copartnership doing business as such, the receipt must be signed with the usual firm signature by one of the members of the firm, who will be required to append his own signature as "one of the firm."

If payment in currency or by check to bearer is made to an individual creditor, the receipt must be signed by him in person.

If payment is made by check to order of any company (incorporated or unincorporated), or firm, or individual by name, and the fact that the check has been so drawn is stated on the voucher, giving its number, date, amount, and depository on which drawn, the receipt to the voucher may be signed by an officer, attorney, or agent of the company, or by an attorney or agent of the firm or individual, stating the capacity in which he signs, without filing with the voucher evidence of his authority to sign. The disbursing officer in all such cases will deliver the check to such person only as he is satisfied is authorized by the principal to receipt the voucher and receive the check.

Par. 90. Receipts for small sums for occasional service paid to corporations, such as railroad, telegraph, turnpike, transfer, express, steamboat, hotel, newspaper, and ice companies, may be signed by the local agent in charge of the business of the company at the place where the service is rendered, or where it begins or terminates, and the certificate of the official making payment that the person to whom payment was thus made was then the local agent of the company, in charge of its business at the place designated, will be sufficient evidence of the agent's authority to receive and receipt for the money paid.

Par. 91. When an account is presented by an individual who is not known to the disbursing officer, the latter will require him to be identified.

Par. 92. The signature to the receipt and the name of the person or business firm as entered at the head of an account must be literally alike.

Par. 93. When a signature is not written by the hand of the party it must be witnessed by an official of the department when practicable.

Par. 94. Disbursing officers will not issue vouchers for unpaid accounts as due bills against the department of public works, but a certified statement of personal services and of wages due may be given to a discharged employee who for want of funds was not paid at time of discharge. Such certificates are not transferable.

Par. 95. Whenever a contract is extended and because of such extension deductions are to be made from sums due or to become due the contractor, the deductions shall be shown upon the vouchers and the balance shall be paid to the contractor. Payment of the expenses due to extensions of contracts shall never be demanded of contractors or received from them by officials or agents in the employ of the department of public works.

Par. 96. When applicable, the following rules for the computation of time in payment for services will be observed:

1. For any full calendar month's service, at a stipulated monthly rate of compensation, payment will be made at such stipulated rate without regard to the number of days in that month.

2. When service commences on an intermediate day of the month thirty days will be assumed as the length of the month, whatever be the number of days therein.

3. When the service terminates on an intermediate day of the month, the actual number of days during which service was rendered in that calendar month will be allowed.



4. When the service embraces two or more months or parts of months but one fraction will be made, thus: From September 21 to November 25, inclusive, will be calculated thus: September 21 to October 20, inclusive, one month; from October 21 to November 20, inclusive, one month; from November 21 to 25, inclusive, five days—making the time allowed two months and five days.

5. When two fractions of months occur and both are less than a whole month, as from August 21 to September 10, the time will be determined thus: August 21 to 30, inclusive (ignoring the 31st), ten days; from September 1 to 10, inclusive, ten days—making the times allowed twenty days.

6. Service commencing in February will be calculated as though the month contained thirty days, thus: From February 21 to 28 (or 29th), inclusive, ten days. When the service commences on the 28th day of that month three days will be allowed, and if on the 29th two days.

7. If service commences on the 31st day of any month, payment will not be made for that day.

8. For commutation of subsistence and for service of persons employed at a per diem rate, payment will be made for the actual number of days.

9. When services are rendered from one given date to another, the account will state clearly whether both dates are included.

10. In computing the wages of persons employed at a per diem allowance, the day on which service begins and the day on which it ends will be allowed in the computation.

Par. 97. In case of discovered error or disallowance of an account upon its examination by the proper authority, the official responsible will, upon notification thereof, unless able to furnish evidence to correct or remove the same, make the proper correction in his next account current, and refer therein to the particular voucher in which the error occurred, or the disallowance was made.

Par. 98. At the time when vouchers are transmitted by an officer with his accounts, if any of the articles purchased as noted thereon have been "expended and applied to the purpose for which purchased," a certificate to that effect may be made by the officer upon the voucher, and when so made the articles referred to need not be taken up on abstracts of property or on property returns.

Par. 99. Requests for the admission, free of duties and charges, of articles imported for the use of the government of the island of Cuba must be accompanied by a list of the same, to be forwarded to the collector of customs, for his information and guidance and for the permanent files of his office.

Par. 100. Vouchers in support of partial payments, or on which there are retained percentages, shall be made in triplicate, one copy to be retained by the disbursing officer and two to be forwarded to the accounting officer. It is proposed that the two vouchers be examined and compared when the officer's accounts are adjusted, one to be subsequently withdrawn by the auditor and filed as a subvoucher with the voucher for final payment. The triplicate vouchers referred to can be made without receipts and without copies of any subvouchers which may be filed with the original vouchers. They should, however, be complete in all other respects and certified to by the proper officials.

#### PUBLIC PROPERTY.

Par. 101. Whatever belongs to the state constitutes public property. Property, which from its nature is totally destroyed by use, such as lead pencils, pens, paper, etc., or which by use becomes a part of permanent work, such as materials of construction, is termed "expendible property." Such property as used may be "expended" and dropped from the return. Property which by use is not used up or completely destroyed is "unexpendible property," and must be accounted for on property returns until disposed of, as provided for in these regulations.

Par. 102. Accountability and responsibility devolve upon any person to whom public property is intrusted, and who is required to make returns therefor. Responsibility without accountability devolves upon one to whom such property is intrusted, but who is not required to make returns therefor. Thus, district engineers shall be responsible and accountable for public property; they may delegate responsibility, but not accountability.

Par. 103. A transfer of public property involves a change of possession and accountability. The transferring official will furnish the receiving official with invoices, in duplicate, accurately enumerating the property, and the latter will return duplicate receipts. The transaction will appear on the property returns rendered by each.

Par. 104. When an official to whom stores have been forwarded believes them to have miscarried, he will promptly inform the issuing and forwarding officials.

Par. 105. If an official to whom public property has been transferred refuses to

receipt for it, the invoicing official will report the facts to the secretary of public works or action. Copies of all papers relating to the transaction will be filed with his returns.

Par. 106. Upon the receipt of public property by an official, he will make careful examination to ascertain its quality and condition, but will not break original packages until issues are to be made, unless he has reason to believe the contents defective. Should he discover defect or shortage he will apply for an inspector to determine it and fix the responsibility. Should he consider the property unfit for use he will submit inventories in triplicate and request the action of an inspector. The same rule will be observed in regard to packages when first opened for issue, and for property damaged or missing while in store.

Par. 107. When packages of supplies are opened for the first time, whether because of apparent defect or for issue, the official responsible, or some assistant designated by him, will be present and verify the contents by actual weight, count, or measurement, as circumstances may require, and in case of deficiency or damage will make written report of the facts to the secretary of public works. If only the official responsible be present and make the report, he will secure the sworn statements in writing of one or more persons regarding the condition of the property when examined.

Par. 108. The giving or taking of receipts in blank for public property is prohibited.

Par. 109. All movable public property will, if practicable, be conspicuously branded, or stamped if of metal, "O. P." before being used.

Par. 110. Public property will not be used nor will labor hired for the government be employed for any private purpose whatsoever, except as authorized by the secretary of public works.

Par. 111. For property worn out in the public service the accountable official will submit inventories thereof and ask for an inspector's action.

Par. 112. Public property which has been condemned will not be purchased by an official who was responsible therefor at the time of condemnation, nor by an official who bore any part in such condemnation.

#### DAMAGED, LOST, DESTROYED, ETC.

Par. 113. Causes of damage to and of loss and destruction of property are classified as follows:

1. Unavoidable causes, being those over which the responsible officials have no control, occurring in the ordinary course of service.

2. Avoidable causes, being those due to carelessness, willfulness, or neglect.

Par. 114. Officials responsible for property will be charged for any damage to or loss or destruction of the same, and the money value deducted from their monthly pay, unless they show to the satisfaction of the governor of the island, by their own affidavits or certificates or by one or more depositions, that the damage, loss, or destruction was occasioned by unavoidable causes and without fault or neglect on their part.

Par. 115. If articles of public property are embezzled, or lost or damaged through neglect, by an employee, the value of damage as ascertained shall be charged to him and set against any pay or money due him.

Par. 116. Whenever information is received that animals or other property belonging to the public service are unlawfully in the possession of any person not in the service, the official responsible for the property will promptly cause proceedings to be instituted and diligently prosecuted before the civil authorities for the recovery of the property, and, if the same has been stolen, for the arrest, trial, conviction, and due punishment of the offender and his accomplices.

Par. 117. Upon satisfactory information that such public property, unlawfully in the possession of any parties, is likely to be taken away, concealed, or otherwise disposed of before the necessary proceedings can be had in the civil tribunals for its recovery, the civil authorities will at once cause the same to be seized, and will hold it subject to any legal proceedings that may be instituted by other parties. Persons caught in the act of stealing public property will be summarily arrested and turned over to the civil authorities for trial.

Par. 118. Officials responsible, after they have failed to get possession of a lost or stolen animal by the ordinary means, may authorize the payment of a reward of not more than \$25 for its recovery. If the animal has been stolen, they may offer an additional reward of like amount for each person arrested, tried, convicted, and sentenced for the theft.

Par. 119. The expenses necessarily incurred by any action under the three preceding paragraphs, with the exception of attorney's fees, will be paid by the department upon proper vouchers approved by the secretary of public works. Officials will promptly report their action to department headquarters.

## PROPERTY ACCOUNTABILITY.

Par. 120. All public property, whether paid for or not, must be accounted for on the property returns.

Empty barrels and boxes and other materials which have a salable value and which are not required for public use, the disposal of which is not otherwise provided for, will be carefully preserved and sold, as convenient, to the highest bidder after advertisement.

The same rule will apply to products of the public lands, by-products from works carried on by the public service, such as old iron from refuse, manure from stables, etc.

Par. 121. Should an official or agent of the government charged with public property fail to render the prescribed returns thereof within a reasonable time, a settlement of his accounts will be made by the secretary of public works, and the money value of the property with which he is charged will be reported against him for stoppage.

## INSPECTION OF PUBLIC PROPERTY.

Par. 122. The secretary of public works shall, with the approval of the governor, appoint an inspector of public property at such times as the needs of the service require one. It will be the duty of the inspector to examine all property properly presented for inspection. His action will be to condemn, recommend to be sold, or declare such property still serviceable.

Par. 123. Inventories of unserviceable property will be prepared and the articles arranged for inspection. Every article will be inspected, and the official responsible will accompany the inspector and be prepared to give all necessary information in regard to it.

Par. 124. Condemned property will be destroyed in the presence of the inspector, and it will be his duty to see that the destruction is so complete that the property may not be again presented for condemnation. Such articles will upon certificates from the inspector be dropped from the returns, copy of certificate to be attached.

Par. 125. When the property is thought by the inspector to be still serviceable no action will be taken.

Par. 126. When in the opinion of the inspector the property is no longer of service to the government, but has marketable value, he will prepare triplicate lists of same, referring to the returns upon which the property is carried. One of these lists will be given to the responsible officer, one retained by the inspector, and the other forwarded to the secretary of public works with the recommendation that the articles enumerated be sold at public auction. The secretary of public works will, if he approves the action of the inspector, order the sale, which will be made after public advertisement.

Par. 127. Public property will not be reported as unserviceable, nor condemned by an inspector, merely because worn or shabby in appearance, when really strong and serviceable.

## EMPLOYEES.

Par. 128. The employees of the department will be divided into two classes—permanent and temporary. The number, grade, and pay of permanent employees shall be fixed from time to time by the governor of the island. Temporary employees may be engaged from time, as the exigencies of the works may demand, under specific authority from the secretary of public works, and as prescribed in these regulations.

Par. 129. Employees will be nominated in every case by the official in immediate charge of the office or work in which they are to be employed, and will be retained in office only so long as the exigencies of the work may demand, and their services are efficient, honest, and faithful. They will not be dismissed on account of political or religious opinions.

Par. 130. Employees will be required to devote their entire time to the work in which they are employed. While permitted to exercise the rights and duties of a citizen, they are forbidden to take an active part in politics. Their service is for the State and not for any party.

Par. 131. Officials having authority to employ have also authority to dismiss or reduce in grade, subject to these regulations.

Par. 132. All expenditures for pay of employees must be confined within the allotments and rates authorized by proper authority.

Par. 133. Employees will be engaged by the month, day, or piece, as best suits the needs of the service. They will be designated upon the rolls in the capacity in which employed and at the rates established. Salaried employees will, in general, be paid

monthly. Laborers will be paid monthly, semimonthly, or at the completion of the work for which engaged, if this be for a shorter period than one-half a month. When employees are discharged and not paid, certificates may be given them, as provided in paragraph 94. These certificates are not transferable.

Par. 134. Eight hours constitute a day's work for all mechanics and laborers employed by or on behalf of the department of public works, except in cases of emergency. This rule does not extend to engineers, firemen, seamen, watchmen, messengers, teamsters, and others, the nature of whose employment is peculiar, and whose services may be required at any or occasionally at all hours of the day.

#### TRAVEL.

Par. 135. 1. To entitle an official to refundment of the cost of transportation and allowances in connection therewith, at the expense of the State, the journey must be specifically authorized by a proper superior previous to its commencement. Such authority will state the special duty enjoined, recite that the travel is necessary for the public service, and direct the official to return to his proper station on completion of the assigned duty, if such return is contemplated. The original order (written authority) and indorsements thereon, or true copy of the same, will be filed with the vouchers before payment will be made.

2. Whenever practicable to do so transportation requests will be issued to cover travel by rail and water, and when so issued, allowance for transportation will not be refunded. When transportation requests are issued to cover travel, the fact shall be noted on the order or other written authority for the journey by the official issuing the request.

3. Transportation by water usually includes subsistence; the cost of the ticket only will be refunded or paid in such cases.

4. *First class.*—Civil officials (also military when on civil duties) whose annual salary is \$1,200 or more, will be reimbursed for first-class transportation and other traveling expenses as follows, viz:

- a. Charge for cab to and from stations, but not to exceed 50 cents each way.
- b. Charge for transfer of baggage to and from stations not to exceed 50 cents each way.
- c. Actual cost of transportation of baggage, where the same is not allowed free on the ticket, not to exceed 100 pounds in weight.

d. Actual expenses for subsistence, not to exceed in any case \$4.50 per diem, while traveling and for the time absolutely necessary for a prompt transaction of the business directed to be performed.

5. *Second class.*—Civil officials whose salary is \$800 and less than \$1,200 shall be reimbursed for expenses, when traveling under orders, as for first class, except for transportation, which shall be at second-class rates, and for subsistence, which is limited to \$3 per day.

6. *Third class.*—All other persons traveling under orders at the expense of the State shall be reimbursed for travel expenses, as for first class, except for transportation, which shall be at third-class rates, and for expense of subsistence, which is limited to \$1.50 per day.

7. Travel fare and allowances, at the rates specified in the preceding sections 4, 5, and 6, due to employees of the department of public works who may be ordered on duty in connection with any specially authorized public work, will be paid from the special appropriation for such work, and by the disbursing officer thereof.

8. Vouchers for travel expenses will be made on forms furnished by the department.

9. Books of transportation requests will be issued to officials authorized to order journeys on application to the secretary of public works.

#### PURCHASE OF SUPPLIES AND ENGAGEMENT OF SERVICES.—GENERAL PROVISIONS.

Par. 136. No contract or purchase on behalf of the department of public works shall be made unless the same is duly authorized by the secretary of public works. No official shall accept voluntary services for the government or employ personal services in excess of that authorized by the secretary of public works, except in cases of emergency involving loss of life or destruction of property.

Par. 137. Supplies, and services not personal, required in the department, will be procured where they can be had the cheapest, quality and cost of transportation in the case of supplies being considered, as follows:

1. After public notice inviting proposals for thirty days or more, or for ten days or more but less than thirty, or for less than ten days, according to the needs of the service.

2. Without public notice.

Par. 138. Personal services are such as the individual employed or contracted with must perform in person directly under the control and supervision of an official or agent of the government, as distinguished from services the performance of which may be delegated by the contractor to others. Bills rendered for such services must contain no charge for material.

The official charged with the duty of making contracts or purchases is responsible for his action.

Par. 139. When it is intended to have any work performed, service procured, or purchase made by contract, the advertisement, however made, and the specifications must be previously submitted to the secretary of public works for his approval.

#### ADVERTISING FOR PROPOSALS.

Par. 140. In cases of large purchases, a period of thirty days or more should intervene between the first publication and the opening of proposals. In small purchases, from ten to thirty days should intervene, and when the public exigency constitutes an emergency and does not permit ten days to intervene, the period should be for as many days as the circumstances will permit. Advertising for proposals by newspapers, in accordance with paragraph 180, will be adopted when time permits, and the quantity or value of the purchase, or character of the services, in the opinion of the purchasing official, will justify the expense. When notice of less than thirty days is given, advertising by circulars sent to principal dealers in the localities where the supplies or services are desired, and posted in public places, is permissible. The purchasing official may advertise by newspapers and circulars at the same time.

Par. 141. When advertisements or specifications thereunder do not announce fixed standards for articles required, they should be so worded as to permit bids to be considered item by item, and the awards to be made for the most suitable articles of each kind offered.

Par. 142. Whenever it is intended to require that guaranties shall accompany proposals, that fact, with the amount in which the guarantors are to justify, must be stated in the specifications. Certified checks to a named amount may be required as a guaranty.

Par. 143. A copy of each advertisement and specification will be promptly forwarded by the official issuing it, direct to the secretary of public works, together with all information required for a complete understanding of the necessity for the proposed contract or purchase. If issued for a period of less than ten days, the reason why a longer period is not allowed will be stated.

#### PROPOSALS.

Par. 144. Information in regard to supplies or services, for which proposals have been invited, will be furnished on application to all persons desiring it, but no person belonging to or employed in the department of public works will render assistance in the preparation of proposals.

Par. 145. Bidders for supplies will be informed of the kind, quality, and quantity of articles required, the place, time, and rate of delivery, and conditions of payment. They will be furnished with such specifications as have been adopted, and will be permitted to examine the standard samples, if there are any, at the places where deposited.

Par. 146. No persons will be informed, directly or indirectly, of the name of any one intending to bid, or not to bid, or to whom information in respect to proposals has been given.

Par. 147. Proposals should be prepared in duplicate or in triplicate, if required, in strict accordance with the requirements of the advertisement and specifications. They should make specific reference to the advertisement and to any plans or specifications which may have been furnished. Each proposal should give the place of residence and post-office address of the bidder, and should be signed by the bidder with his usual signature in full.

Par. 148. A proposal by a person who affixes to his signature the word president, secretary, agent, or other designation, without disclosing his principal, is a proposal of the individual. That of a corporation should be signed with the name of the corporation, followed by the signature of the president, secretary, or other person authorized to bind it in the matter. That of a firm should be signed with the firm name by one of the members of the firm. If the signature is that of an attorney or agent of a corporation, or an attorney or agent of a firm, or individual, and his authority to act on behalf of his principal is not a matter of general notoriety in the locality where the proposals are opened, the officer who opens proposals should, before con-

sidering the proposal, satisfy himself that the signer is vested with sufficient authority to represent his principal in the transaction.

Par. 149. In proposals numbers and prices will be written in words as well as expressed in figures; but when a variety of articles, such as stationery, hardware, etc., is required, quantities and prices may, if the amounts involved are considerable and the forms of proposals so indicate, be expressed in figures only.

Par. 150. Erasures or interlineations should be explained by the bidder in the proposal over his signature.

Par. 151. Guaranties, signed by two responsible parties, or a deposit of a certified check, will be required to accompany proposals whenever, in the opinion of the official authorized to make the contract, they are necessary to protect the public interests.

Par. 152. The guaranty will be in duplicate, or in triplicate if required, and will be made out and executed with the necessary justifications in accordance with blank forms furnished by the department.

Par. 153. Proposals with their guaranties will be securely sealed in suitable envelopes, indorsed and directed as required by the advertisement, and must be in the possession of the officer addressed before the hour appointed for the opening. No responsibility will attach to an officer for the premature opening of any proposal not so indorsed as to clearly show its character.

Par. 154. When an advertisement calls for proposals to furnish labor or supplies at more than one place, a separate proposal will be made for performance at each place, but all may be submitted in the same envelope.

Par. 155. Proposals received prior to the time of opening will be securely kept. No proposals will be received after the time fixed for opening.

Par. 156. Before the time for opening, any bidder may, without prejudice, withdraw from competition by giving written notice of his decision to the officials holding his bid, and when his bid is reached at the opening it will be returned to him or his authorized agent unread.

Par. 157. Proposals will be opened and will be read aloud at the time and place appointed, bidders having the right to be present; and each proposal will then and there be numbered and entered on the abstract, the articles being entered in the order in which they are to appear on the returns. A copy of the advertisement under which the proposals are received, with a copy of the specifications, if any, will be attached to the upper left-hand corner of the abstract.

#### AWARDS.

Par. 158. Except in rare cases, when the department elects to exercise the right to reject proposals, the awards will be made to the lowest responsible bona fide bidder whose proposal for furnishing the proper article is not unreasonable.

Par. 159. Slight failures on the part of the bidder to comply strictly with the terms of an advertisement should not necessarily lead to the rejection of his bid, but the interest of the government will be fully considered in making the awards.

Par. 160. When no guaranty is required bidders must, if called upon by the awarding official, furnish satisfactory evidence before the award is made of their ability to carry their proposals into effect.

Par. 161. The abstracts of the bids will be forwarded to the office of the secretary of public works, together with one copy of each bid received. The officials asking for the proposals will send with the abstract written recommendation for action in regard to accepting or rejecting the bids received, and no such bid will be accepted or rejected by the official in charge of the work in advance of the approval by the secretary of public works.

Par. 162. When abstracts of bids are forwarded to the office of the secretary of public works, note will be made thereon of the balance of the appropriations for the work available for payments under the contract about to be entered into, and to obtain this balance all outstanding liabilities and amounts covered by existing contracts should be deducted from the unexpended appropriations for the work in so far as their expenditure has been authorized by approved projects. The abstracts will also show the totals of the respective bids.

#### METHODS OF PURCHASE.

Par. 163. A purchase of supplies or engagement of services will be made:

1. By contract reduced to writing and signed by the contracting parties, with their names at the end thereof. Agreements of this character only are termed "contracts" in the regulations.

2. By written proposal and written acceptance.

### 3. By oral agreement.

Par. 164. When delivery or performance does not immediately follow an award or bargain the first method will be used. When delivery or performance immediately follows an award or bargain the second method may be resorted to.

Par. 165. All contracts and papers connected with the same, made by officials of the department in charge of works, will be made in accordance with the printed forms prescribed by the secretary of public works, and these forms, and other printed forms allowed, will be furnished from the office of the secretary when required.

Par. 166. A contract of a corporation should have the name of the corporation written in the body of the instrument as one of the parties thereto, and should be signed by the officer or person who has been authorized to contract in its behalf, who should sign the corporate name and his own, and affix the corporate seal, if there be one. The contracting official will in all cases satisfy himself that the signer has authority to bind the corporation, and will either require from him satisfactory evidence thereof and file the same with the contract, or will certify on the contract that he has satisfied himself of the signer's authority, and has waived this requirement.

Par. 167. All contracts will be executed in quintuplicate.

Par. 168. Extensions of contracts are not in any case to be made until the approval of the secretary of public works has been obtained.

### CONTRACTOR'S BOND.

Par. 169. Bonds for the faithful performance of contracts for supplies or services will be required when the consideration is \$3,000 or more, whatever may be the length of time required for the full performance of the contract. Bonds may be exacted or, at the discretion of the official concerned, waived in the following cases:

1. When the consideration is less than \$3,000 and the contract is to be fully performed within thirty days from its date.

2. When the consideration is not more than \$250, whatever may be the length of time required for full performance.

Par. 170. The amount of penalty in a contractor's bond will be fixed by the contracting official, and will not be less than one-tenth nor more than the full amount of the consideration of the contract. Nothing in this paragraph is to be construed as authorizing the waiving of bonds required under paragraph 169.

Par. 171. When bonds for the faithful performance of contracts are exacted, they will be made and executed with the necessary justification and certification of sufficiency of sureties, in accordance with the instructions printed on the blank forms of contractor's bonds furnished by the department. Such bonds must be executed by the contractor as principal, and by a surety company, or by at least two sufficient and responsible persons, who must be citizens of the island of Cuba, as sureties. Each must affix to his signature a seal, and each signature must be attested by at least one witness. When practicable, there will be a separate witness to each signature.

Par. 172. A company duly incorporated under the laws of the United States or the island of Cuba, and legally authorized to guarantee bonds, may be accepted as surety. A firm, as such, will not be accepted as surety, nor a partner nor a copartner for the firm of which he is a member. Stockholders, who are not officers of a corporation, may be accepted as sureties for such corporations.

Par. 173. A guarantor, or the guarantors, to a bidder's guaranty may be accepted as surety, or sureties, to the bond of the same person as contractor, provided such guarantor or guarantors are able to justify as required for the bond.

Par. 174. The sureties, if noncorporate guarantors, must jointly justify in double the amount of the penalty. The affidavit must be taken before a person authorized by the laws of the island of Cuba.

Par. 175. Contractor's bonds will be executed in duplicate, one to accompany the copy of the contract which is sent to the auditor for the island and the other retained by the official who makes the contract.

Par. 176. When a contract is entered into for the construction of any public building, or the prosecution and completion of any public work, or for repairs on any public building or public work, the contractor will be required, before entering upon performance of the same, to include in the bond given for the faithful performance of the contract the further obligation that he will promptly make payments to all persons who supply him with labor and materials for the prosecution of the work provided for in such contract. A certified copy of this contract and bond will be furnished to any person who has supplied such labor or materials, upon his application to the department, accompanied by an affidavit that the labor or materials have been supplied by him and have not been paid for by the contractor.

## ORAL AGREEMENT.

Par. 177. Supplies may be procured and services engaged by oral agreement, in the manner common among business men, in the following cases:

1. When the public exigencies require immediate delivery of supplies or performance of services and there is no time to advertise by newspapers or circulars.
2. When prices of articles are fixed and uniform and no competition can be had.
3. When proposals have been invited and none have been received.
4. When proposals are above the market price or otherwise unreasonable.
5. When the aggregate amount of a purchase, including all items that can reasonably be consolidated, does not exceed \$200, if the interests of the government will be promoted by dispensing with public notice or advertisement.

Par. 178. Before making a purchase by oral agreement the official will inform himself concerning prevailing prices by inquiry among principal dealers in his locality.

Par. 179. When it is not practicable or advisable to make contracts for public works that have been authorized, immediate report of this fact will be made to the governor through the secretary of public works and authority obtained to proceed without (as in cases where no bids have been received after due advertisement, or in the matter of building or repairing public roads, when it is desirable that the work be performed by the residents living along the highway, etc.).

## NEWSPAPER ADVERTISING.

Par. 180. Advertisements for proposals for materials or labor for public works should be inserted in the official paper of the locality where the work is to be performed and in such papers and in such form as will reach probable bidders, and should be restricted as much as is compatible with the necessity of securing the best prices for the work.

Par. 181. No official advertisement will be published in any newspaper except under special written authority from the secretary of public works, which special authority shall authorize the publication of a given advertisement a specified number of times in a designated newspaper or newspapers.

Par. 182. The secretary of public works shall procure and keep in his office a file of prices for advertisements of the various newspapers in which notices are to be inserted.

Par. 183. Officials will observe conciseness in wording advertisements, and the matter, including the heading and the name of signing officer, must be set up in one paragraph, without dash or blank line, leading, or display, and in type no larger than that ordinarily used in advertisements. The specifications and conditions governing a contract will not be published; a statement that they will be furnished on application will suffice. The following is a sample of advertisement set up in accordance with these requirements:

"Proposals for cement. Office of district engineer, department of public works, Matanzas, Cuba, February 12, 1900. Sealed proposals for furnishing and delivering cement for use in repairing the government building, corner Prado and San Jose streets, Matanzas, will be received here until 12 m., February 24, 1900, and then opened. Information furnished on application. Envelopes containing proposals should be indorsed 'Proposals for cement,' and addressed Jose Gonzalez, district engineer."

Par. 184. Advertisements will, as a rule, allow thirty days to intervene between date of first publication and date of opening bids. If necessity require, a shorter period may be allowed, but no period of less than ten days will be designated except in cases of emergency. Whenever it is found desirable to advertise in the professional papers in the United States fifteen days additional must be given to include the time for the mail to go and return.

Par. 185. Ordinarily advertisements will be given six insertions in daily or four in weekly papers. In daily papers when more than ten days are to intervene between the date of first publication and date of opening, four consecutive insertions will at once be given, and two consecutive insertions before the date of opening.

Par. 186. Vouchers covering bills for advertising in newspapers will be prepared by the publisher in duplicate and presented to the official ordering the work, who will certify to their correctness and forward them to the secretary of public works for approval and comparison with prices on file before payment is made. Clippings from each insertion, with proper dates, will be attached to the vouchers.

Par. 187. Claims of publishers of official newspapers for advertisements copied from other newspapers without authority will not be paid.



## JOB PRINTING.

Par. 188. Job printing required will be executed under contract, thirty days' notice when practicable being given of the opening of the proposals. The period of the contract will not extend beyond the end of the fiscal year in which made, and the contract will be submitted to the secretary of public works for approval.

Par. 189. Printed letter and note headings for district offices will contain only the designation of the office, post-office address, and blank dates. Names of officials or other persons will not be printed on letter or note headings for use in any branch of the service.

Par. 190. Officials will, as a rule, obtain all blank forms, blank books, etc., by requisition upon the secretary of public works.

Par. 191. When specifications are printed for material or labor for works of the department, and pertaining to work to be done or materials to be used in actual construction, fifty copies will be printed and forwarded to the secretary of public works, in addition to the number required by the officer in immediate charge of the work.

## CORRESPONDENCE.

Par. 192. Official letters from an employee to one of his superiors must be transmitted through official channels, i. e., through his immediate superior, and so on. Superiors will, in each case, duly transmit such letters without delay, but will be permitted to accompany them by such remarks as may be pertinent. Should an inferior employee have reason to believe that his letter has not been transmitted, he can send a copy direct, accompanied by an explanation of the reason for such action.

Par. 193. An official letter should refer to one subject only; letters of transmittal will be used only when necessary, and when used must refer only to the matter transmitted; none are required with rolls, returns, or periodical reports. Telegrams will be followed by official copies sent by first mail.

Par. 194. Letter paper will be folded in three, and foolscap in four equal folds, parallel with the writing. The first fold will be used exclusively for a brief analysis of the contents of the communication, the office marks, and note of inclosures.

Par. 195. The post-office address of an official's station will be given in his official letters. Indefinite expressions of locality, which do not indicate where the letter was written, will not be used.

Par. 196. Official communications will be signed or authenticated with the pen and not by facsimiles. Signatures will be plainly and legibly written.

Par. 197. A letter will be properly briefed at the first office at which it is received and entered.

Par. 198. Indorsements commence at the top of the second fold and are numbered serially in order of dates on the successive folds, leaving room after each for office marks. Additional space for indorsements will be provided by pasting slips of paper on the under side of the last fold (right edge of original paper), each slip, when attached, to have the same length and width as the original fold, and to turn back upon the last fold like the leaf of a book.

The first fold on which the brief is made is always on the outside. Printed labels, by way of indorsement, will not be pasted on official papers. In no case will a loose wrapper be placed around an official paper, except as a mere covering.

Par. 199. All inclosures will be numbered and given the proper office mark. Inclosures to the original communication are noted on the first fold, just below the brief. If others are added when an indorsement is made their number will be noted at the foot of the indorsement to which they pertain and also on the first fold of the original communication. To the latter notation will be added the number of the indorsement to which they belong, thus: "One inclosure, fifth indorsement." Inclosures to indorsements are numbered in the same series as those to the original paper, and the number of the indorsement to which they belong is added below. If few in number and not bulky, inclosures may be kept inside the original paper; otherwise they will be folded together in a wrapper marked "inclosures."

## STATIONERY.

Par. 200. Official stationery will be used for official business only. Blank forms as approved by the governor of the island, official paper, and penalty envelopes will be obtained from the secretary of public works on application.

Par. 201. Official communications and other mailable matter relating exclusively to the public business will be transmitted through the mails free of postage if inclosed in the "penalty envelope."

Par. 202. Packages of public property weighing not more than 4 pounds may be sent through the mails under cover of the penalty envelope. Penalty envelopes with return address may be furnished to any person from whom official information is desired, or for the return of official vouchers, but will not be furnished to merchants or other dealers to cover the transmission of public property.

Par. 203. The use of freight or express lines for transmitting official letters or packages that can be sent by mail is forbidden.

Par. 204. The penalty envelope will not be used for foreign correspondence.

## APPENDIX C.

### DETAILS OF CONSTRUCTION.

For the purpose that the limited amount of available funds in the last half year might be employed in the construction of roads with the greatest possible efficiency and use, this department has adopted the following details and measurements for the building of turnpikes. Those of the general plan will be surveyed as soon as possible and will follow the lines of the present public roads. The greatest grade shall not in general exceed 5 per cent, but in exceptional cases and for short distances only it may reach 7 per cent. The width of the solid roadbed shall be 5 meters, which is ample to allow the widest vehicles used in the island to pass each other, such as the ox carts. The transverse curve of the roads shall be nearly parabolic with a difference of height between the center and edges of the roadbed of one-fortieth of the width of the road on level sections; but this difference will directly vary in accordance with the grade of the road, increasing to one-thirtieth or one-twenty-fifth of the width of the same, with a maximum grade of 5 per cent, in order that the water will rapidly flow toward the ditches and thus preventing the lengthwise wear of the roadbeds that would take place should their crowns be less curved.

The most easy and commodious method to make the aforesaid crown curve is to give a height to the quarter stakes—that is, those in the middle of the half between the center and edges on both sides—of one-fourth less than those of the center or three-fourths more than those of the edges; of difference in height as regards both. (See drawings.) With the said 5 stakes the foreman is enabled to have the work done with rapidity, facility, and exactness.

Should the land be soft it should be removed to the depth that may be judged necessary and filled in with stone or sand.

Every tree, stump, or root in the roadbed must be removed.

The surface of the roadbed must be parallel to the finished service of the same. On each side of the road there will be open ditches of the necessary width and depth for the drainage of the roads. It will be observed in the accompanying plans that the bottom of the ditches are much lower than the bottom of the roadbed. They are made so for the purpose of collecting all filtrations and keeping the roadbed as dry as possible; the width of the bottom of ditches will be 40 centimeters as a rule.

At the abrupt edges at each side of the firm roadbed throughout the entire length of the road there shall be placed undressed stone to the same height as the roadbed, for the purpose of preventing the spreading of the broken stone and giving greater rigidity to the work. From the said edge to the inside edge of the ditch there will be a distance of 1.35 meters, which space shall be rolled whenever possible on its part adjoining the roadbed. The total width between the outsides of the two ditches will be 8.50 meters.

On high grounds having a firm foundation and good natural drainage 0.15 centimeters thickness of macadam or broken stone will be used, as per plan No. 2, and in soft ground there will be used 0.15 centimeters of Telford or large stone as a base, and upon it 0.10 centimeters thickness of macadam, as per plan No. 1.

The sides of the excavation shall be as follows: 4:1 for rock; 1:1 for compact earth; 1:1½ for loose earth. The latter will also govern for gradings.

After the excavation or grading is finished the ground shall be evened off—that is, given form—thus making the road space and rolling the bed before placing any stone thereon. Whenever the Telford method is used the bed shall be carefully rolled and made even, its surface to be parallel to the top surface of the finished road and 25 centimeters below it.

The Telford stone shall be put in by hand and rolled, the surface of which must be parallel with and 10 centimeters below the top layer.

The broken stone must be from 3 to 6½ centimeters in size, spread over in a layer

of 10 centimeters thickness evenly when the Telford base is used, or of 15 centimeters of thickness when there is a natural firm base and only macadam is used. This latter layer shall also be rolled, and after it has been made quite compact there shall be spread over it a light layer of siftings—sand, small pieces of soft limestone, or argillaceous earth—which shall also be rolled in order to make more compact the work; sprinkling shall be used in connection with rolling.

The foregoing is a recapitulation of the methods and measurements adopted for the building of roads. The manner of employing each of the said methods and the other details relating thereto is described in the blank proposal sheets that are sent herewith.

The cost of building roads according to the dimensions and details hereinbefore mentioned, without counting the cost of excavations and gradings, bridges, culverts, nor the purchase of lands, but only the fixed and ordinary expenses for all kinds of lands, is as follows:

*Cost per kilometer.*

FORM NO. 1.—TELFORD—MACADAM.

1,000 linear meters final leveling of grade of roadbed, at 50 cents .....	\$500.00
750 cubic meters of stone for the first layer, at \$1.50 .....	1,250.00
500 cubic meters of stone for second layer, at \$2.25 .....	1,125.00
1,000 linear meters spreading of first layer, at 15 cents .....	150.00
1,000 linear meters spreading of second layer, at 10 cents .....	100.00
1,000 linear meters of top dressing and spreading same, at 10 cents .....	100.00
1,000 linear meters rolling grading, at 3 cents .....	30.00
1,000 linear meters rolling first layer, at 15 cents .....	150.00
1,000 linear meters rolling second layer, at 15 cents, and sprinkling .....	150.00
1,000 linear meters rolling top dressing, at 2 cents .....	20.00
500 cubic meters of ditches opened, at 30 cents .....	150.00
180 cubic meters of stone for edges of road, at \$1.60 .....	288.00
1,000 linear meters placing of same, at 5 cents .....	50.00
Total .....	4,013.00
Professional direction of work, 10 per cent .....	401.30
	4,414.30
Incidental expenses, 5 per cent .....	223.22
Total .....	4,637.52

FORM NO. 2.—MACADAM.

1,000 linear meters final leveling of grading, at 50 cents .....	\$500.00
750 cubic meters of broken stone for roadbed, at \$2.25 .....	1,687.50
1,000 linear meters spreading of broken stone, at 20 cents .....	200.00
1,000 linear meters of top dressing and spreading same, at 10 cents .....	100.00
1,000 linear meters rolling of grading, at 3 cents .....	30.00
1,000 linear meters rolling and sprinkling of macadam, at 20 cents .....	200.00
1,000 linear meters rolling of top dressing, at 2 cents .....	20.00
500 cubic meters of ditches opened, at 30 cents .....	150.00
180 cubic meters of stone for edges of roadbed at \$1.60 .....	288.00
1,000 linear meters placing same, at 5 cents .....	50.00
Total .....	3,125.50
Professional direction of work, 10 per cent .....	312.55
	3,428.05
Incidental expenses, 5 per cent .....	171.90
Total .....	3,609.95

This data is the average taken in connection with different works in the province of Habana.

TECHNICAL SPECIFICATIONS.

DESCRIPTION OF WORKS.

UNITS OF WORK.

ART. 1. The units of work estimated for, which the project consists of and which shall serve as a base of comparison to calculate the total amount of the bids received, are as follows: First, cubic meters of earth clearing; second, cubic meters of lot clearing; third, cubic meters of stone or earth grading; fourth, cubic meters of dry masonry work; fifth, cubic meters of ordinary mason work; sixth, cubic meters of ordinary mason work with hydraulic mortar; seventh, linear meters of macadam roadbed; eighth, linear meters of Telford roadbed; ninth, linear meters of vitrified terra cotta piping of — centimeters diameter; tenth, linear meters of iron piping for water of — centimeters diameter.

## DIMENSIONS.

ART. 2. The total length of this section of road is ———, its width shall be 8 meters 50 centimeters, subdivided as follows: Five meters for the roadbed, 1 meter 35 centimeters from edge of roadbed to the inner edge of the bottom of the ditches, and 40 centimeters of bottom width of each of the ditches.

## EXCAVATION FOR ROAD.

ART. 3. The excavation of the road shall be carefully made and rolled so as to remain perfectly even; 25 centimeters shall be for the Telford base and 15 centimeters for the macadam, all below the grade and cross section of the finished road. Its form shall be in accordance with official plans Nos. 1 or 2, as the case may be.

## DITCHES.

ART. 4. The contractor shall confine himself in the matter of opening the ditches to the dimensions and inclines indicated in official plans of roads Nos. 1 and 2 as well as to the amount of incline; in every case the judgment of the engineer in charge to prevail in regard to the different kinds of earth indicated in the said plan.

The plan of the bottom of the ditches shall be in every case parallel to the top line of axis of the road, unless from some local circumstance it might be convenient to change the grade of the ditch in the opinion of the engineer in charge.

## INCLINATION OF THE SIDES OF CLEARINGS AND OF EARTH AND STONE GRADINGS.

ART. 5. The inclinations of the sides of clearings and earth and stone gradings shall correspond to the nature of the clearing or grading specified in the plans of cross sections of each kind of work. Nevertheless the contractor shall submit to whatever the engineer in charge may direct if, from the nature of the clearing, earth or stone grading it might be convenient to change the inclination during the execution of the work or make them different at one place, according as the nature of the different strata of earth where they are situated might require.

## BUILDING WORK.

ART. 6. The form, dimensions, and materials of building work and of its different parts shall be totally in accordance with what is detailed in the plans and statements of cubic measurement (here shall be designated the construction of each one of the parts of the works).

## ROADBED.

ART. 7. The roadbed shall have the form specified in the official plans adopted for cross sections and the system shall be changeable, employing at times macadam and at others Telford-macadam, as the chief engineer may order. The macadam system shall comprise a uniform covering of 15 centimeters thickness after being rolled, on top of which there shall be spread 1 centimeter of top dressing. The Telford-macadam system shall comprise two thicknesses, the first of large stones to be 15 centimeters thick, and the second with an uniform covering of 10 centimeters after being rolled. On top of the last covering of stone there shall be spread 1 centimeter of top dressing.

## NECESSARY REQUIREMENTS FOR MATERIALS AND FOR WORK.

## EARTH AND STONE GRADINGS.

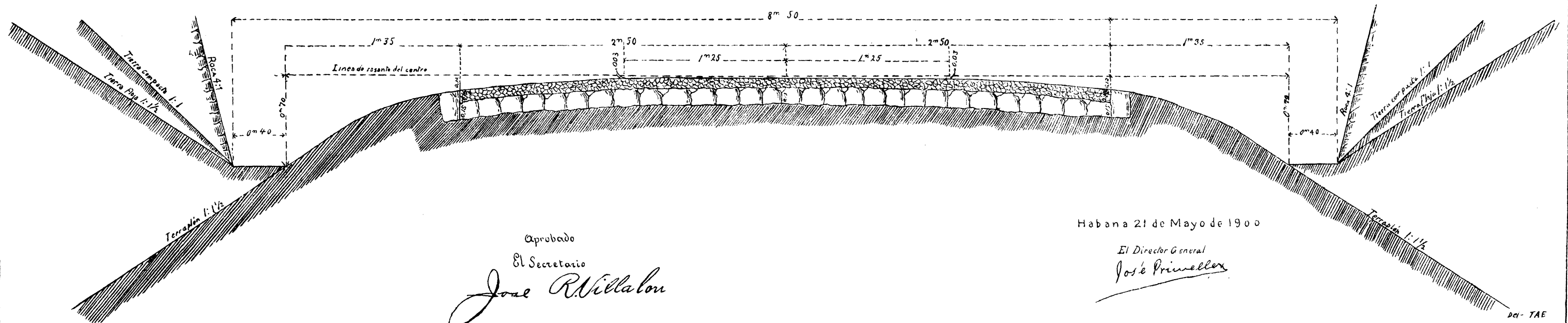
ART. 8. The contractor may employ for this work the material obtained from clearings and openings of ditches, excepting the stone which in its greater diameter may exceed 20 centimeters, or those which from their organic origin or other causes might be detrimental in the opinion of the engineer.

## SOURCE AND QUALITY OF STONE FOR THE ROADBED.

ART. 9. The stone which must be employed for this work shall be precisely of the best quality and kind, to be taken from the quarries that may be designated or fixed upon by the contractor, in which latter case they shall be examined and accepted by the engineer in charge.

MODELO OFICIAL N°1

Escala 1/30



Habana 21 de Mayo de 1900

El Director General  
José Primeller

ci- TAE



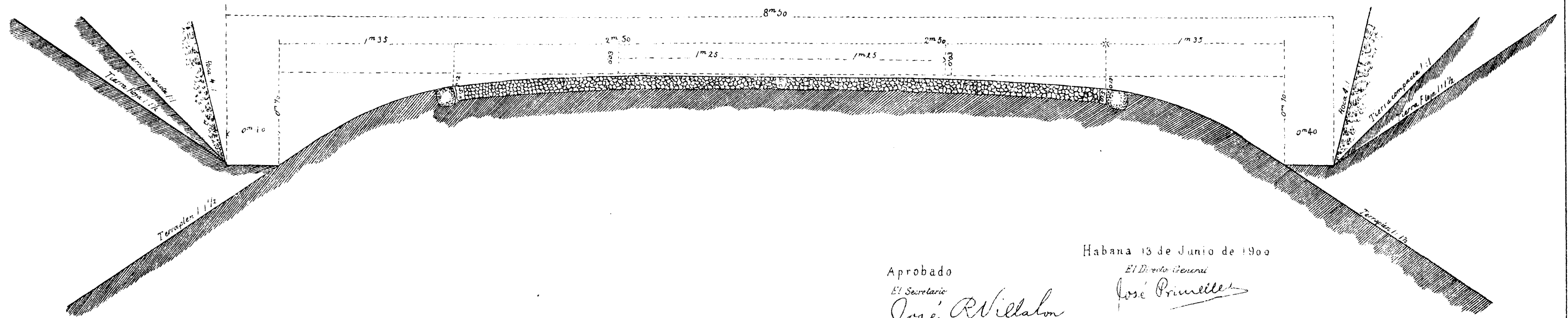
DEPARTAMENTO DE OBRAS PUBLICAS.

CAMINOS.

MODELO OFICIAL N.º 2

SECCION TRANSVERSAL DE MACADAM

Escala  $\frac{1}{80}$



Aprobado

El Secretario

José R. Villalón

Habana 13 de Junio de 1900

El Director General

José Primelles





## CRUSHING OF STONE.

ART. 10. The crushed stone for macadam shall be from 3 to 6 centimeters in its greatest diameter, and for Telford from 10 to 25 centimeters wide, 15 to 37 long and from 12 to 15 centimeters thick. The employment of more than 10 per cent of large stones (of less than 15 centimeters thickness) will not be allowed. The contractor shall allow the tests that the engineer in charge may determine upon in each case to insure compliance with the conditions hereinbefore stated; at the same time the stone after being crushed must be free from dust, earth, and other substances that might cause detriment to its use.

## MATERIAL FOR TOP DRESSING.

ART. 11. The material which may be employed for top dressing shall be exclusively sand of all kinds, and stone, gravel, or detritus.

## LIME.

ART. 12. The lime for mortar shall be unslacked; it shall be obtained from hard limestone and directly from the kiln; it must not contain more than 10 per cent of foreign substances, such as silicate, aluminum, etc.; it must be perfectly burnt and slacked by the sprinkling of the least possible quantity of water passed through sieves having 5-millimeter meshes for coarse mortar, and  $2\frac{1}{2}$ -millimeter meshes for fine mortar, before being used. In case it is not possible in the judgment of the engineer in charge to bring unslacked lime to the work, special care must be taken to see that it has been recently slacked.

## WATER.

ART. 13. The water to be employed in the preparation of mortar, as well as for other purposes, shall be fresh water.

## CEMENT.

ART. 14. The cement to be employed shall be "Portland" of superior quality, preference to be given to the gray or greenish gray color. Its volume shall be constant, which fact shall be proved by means of a paste of pure cement being placed for twenty-four hours in water, during which time it shall not show any signs of cracking or change of form. The cement shall be ground to such a fineness that 90 per cent of it may pass through a sieve having 900 meshes per square centimeter. The thickness of the wires that form the texture shall be one-half the space between said wires. All cement should be rejected that commences to set before thirty minutes, or has not commenced to set before three hours; in both cases from the moment in which water was added. In order to determine when this takes place, a cement paste shall be made, cylindrical in form, with a diameter of 8 centimeters and a height of 4 centimeters. The moment in which a needle with the thickness of 1 square millimeter and under a total pressure of 300 grams can not penetrate through the entire thickness of the paste shall be considered the time at which it has commenced to set. The moment in which the said needle leaves no perceptible impression on the surface of the paste shall be considered as the time or moment in which the cement becomes set. The tensile strength of the cement shall be 8 kilograms per square centimeter as a minimum after being mixed and set in the open air and submerged in water for twenty-four hours. All cement employed in the work shall be first examined and accepted by the engineer in charge, who must submit to the aforesaid tests at least one barrel in every five of all lots and brands that may be received. The contractor is under obligation to have on deposit at the work a sufficient quantity of cement to allow tests to be made at all times without retarding the progress of the work being done. The arrival of each invoice of cement shall be immediately reported to the engineer.

## SAND.

ART. 15. The sand to be employed shall be free from earth and organic substances. It must be gritty to the touch and produce a certain sound when pressed in the hand. When mixed with water the latter should remain perfectly clear. Fresh water only should be used. In case of necessity it shall be washed and screened.

## STONE FOR MASON WORK AND FLOORS.

ART. 16. All stone that is used in this kind of work shall be of fine grain, homogeneous, uniform texture, compact, free from organic defects, and of a quality satisfactory to the engineer in charge.

## WALL MATERIAL.

ART. 17. No wall material shall have a thickness less than 15 or a length less than 30 centimeters.

The stone for walls shall be roughly dressed and the faces shall be nearly rectangular.

## BRICKS.

ART. 18. Bricks shall be of the best quality and be as follows: (1) With smooth faces, parallel sides, sharp edges, and straight angles; (2) of fine grain, compact and uniform texture, hard and well baked, without cracks, and giving a clear and metallic sound on being struck; (3) they must not become softened in water nor absorb more than 10 per cent of water of their own weight; (4) they must resist a crushing strain of not less than 100 kilograms per square centimeter; (5) their specific gravity must be over two.

## VITRIFIED TERRA COTTA PIPING.

ART. 19. Terra cotta piping shall be of the best quality, vitrified with salt, exempt from cracks and blisters, and perfectly straight and round.

## CAST-IRON PIPE.

ART. 20. Cast-iron pipe shall be of the best quality for the conduction of water, and free from all defects.

## COMMON MORTAR.

ART. 21. Common mortar shall be composed of two parts of live lime and three of fine sand. It shall be prepared in the following manner: The lime and sand shall be thoroughly mixed dry, and afterwards the necessary amount of water added and mixed until a smooth paste of sufficient consistency and uniform color is obtained.

## HYDRAULIC MORTAR.

ART. 22. Hydraulic mortar shall be composed of one part of cement and two of sand and shall be prepared in a manner prescribed in the preceding article.

## HYDRAULIC CONCRETE.

ART. 23. The concrete shall be composed of one part of cement, two of sand, and four of stone.

Concrete shall be prepared in the following manner: First, the lime and cement shall be thoroughly mixed dry, and the necessary water then added and afterwards mixed until the proper consistency and uniform color is obtained. The mortar having been mixed, the broken stone, thoroughly moistened, shall be added thereto, and all mixed together until the stone is completely covered with mortar, the latter filling all spaces. Concrete should be prepared for immediate use.

## EXECUTION OF THE WORK.

## LAYING OUT.

ART. 24. The engineer in charge of the work, as may be required, will lay out the general course of the work, firmly driving the stakes that may be necessary, the same to be furnished by the contractor, both for the purpose of indicating the transverse and longitudinal grades of the roadbed, as well as for the situation, depth, width, and incline of the sides of ditches and of other works.

## CLEANING OF ROADS.

ART. 25. The cleaning of roads shall consist of the cutting down of weeds, taking away of garbage, trunks, and roots, as well as of any other organic or inorganic matter that might be injurious in the opinion of the engineer; all of which shall be

transported by the contractor to a proper distance from the road in order that in no case can any of the same be confounded with the materials to be employed in the works, understanding by the word "road" not only the space occupied by the roadbed, but that also by walks, ditches, and inclines.

#### CLEARINGS.

ART. 26. The products of clearings that are not employed by the contractor in earth or stone levelings, or in other works, shall be placed in piles at a distance to be designated by the engineer, or at the work at a place to be pointed out by the same.

#### EARTH AND STONE GRADINGS.

ART. 27. The gradings made in layers, the thicknesses of which must not be greater than 30 centimeters and each one rolled by a cylinder weighing not less than 2 tons. The contractor shall not proceed to lay the roadbed upon the earth or stone gradings until the latter are in the judgment of the engineer perfectly solid and adjusted to the curve indicated in the plans of cross sections. The said gradings must be finished at a distance of 15 or 25 centimeters below the top road grade according to the class of roadbed, as it may be either of macadam or Telford macadam; in general, the width of the upper part of the earth or stone gradings shall be 7 meters unless the engineer in charge should otherwise order in special cases. Before proceeding with the work the contractor must properly prepare the land, making use of plows or other implements, in order that the new material may become amalgamated and form a bond with the old.

#### DITCHES RESULTING FROM SUPPLYING EARTH FOR GRADINGS.

ART. 28. In cases where gradings are made with earth coming from the opening of ditches at the sides of the road, the engineer will issue the necessary orders that the said ditches be opened to the necessary depth and with the proper incline; and there shall always be left without any excavation or draining from the bottom of the inclination of the grading a space with a minimum width of 1 meter, which shall be greater in proportion as the grading is higher. In every case the width of the said space shall be fixed by the engineer in charge.

#### DITCHES.

ART. 29. The ditches shall be opened only on one side of the clearing when the road grade is sloping, and on both sides when it is level or when it is being built on natural ground which has insufficient fall to carry off the water. The ditches shall have outlets at the places indicated by the engineer in charge.

#### REMOVAL OF DIRT FROM THE DITCHES.

ART. 30. It shall be the duty of the contractor to remove the dirt coming from the opening of ditches to a distance not less than 1 meter from the upper edge of the same. In deep diggings where the shoveling of the dirt can not be done, it shall be transported to the proper point in order that there may not be any danger of its returning of itself to the place from which it was taken, nor of being washed in by the rain or carried away to any other place.

#### DUMPS.

ART. 31. The products of the clearing that may have to remain to form dumps shall be at least 1 meter distant from the upper edge of the grade; this distance shall be greater in proportion to the greater height of the pile of the products and to the firmness of the earth upon which the dumps are made, and in every case it will be indicated by the engineer in charge.

#### FINAL PREPARATION OF EARTHWORK.

ART. 32. All excavations and gradings shall be properly finished. The finishing of the gradings shall only affect the edge and a belt the width of which shall be designated by the engineer in charge, but which shall not exceed 1 meter from the edge and shall be measured on the lines of the greatest grade of the incline.

## TRANSPORTING, UNLOADING, AND PILING.

ART. 33. The transportation of stone may be done by the contractor whenever it suits his convenience, either at the time of its being immediately needed or in anticipation, in which case he will be allowed to deposit it on the walks of the road; but it is to be understood that although the manner of piling is not specified, in no case must public transit be obstructed in a manner that on any part of the road two vehicles can not pass each other.

## EDGES OF ROADBED.

ART. 34. Upon the excavation, after having been rolled and accepted by the engineer in charge of the work, first there shall be placed longitudinally a row of large stone (of about 30 centimeters at their greatest diameter), driven and firmly placed in a furrow opened for the purpose on both sides of the road at a distance, one from the other, of 5 full meters.

## TELFOED BASE.

ART. 35. In the prepared excavation for the road as specified in article 3 there should be placed a foundation of stone, varying in size in accordance with stipulations of article 10. The stone for the Telford base shall be placed by hand upright upon their widest faces and with their greatest normal size toward the axis of the road, forming a compact and firm base. The stone should be placed close together, such being employed as are more appropriate from their size and shape for proper adjustment, and rammed wherever it is practicable. No stone shall be employed having a point that would come nearer than 10 centimeters to the grade and to the cross section. If any section should have a point it should be broken off with a sledge hammer, so that a layer of broken stone of 10 centimeters thickness may be placed thereon. The Telford base shall be rolled either by steam roller or one drawn by animals. All holes shall be filled in with broken stone and the base again rolled until even, and at 10 centimeters below the grade at cross section.

## MACADAM.

ART. 36. The crushed stone should be spread and rolled in the road excavation after being duly prepared in the manner stipulated in article 3. The spreading of the macadam may be done in bulk and in such quantity that after being rolled it should have a uniform thickness of 10 centimeters, indicated in official form No. 1; but in cases where it is not spread upon a Telford base it shall have a uniform thickness of 15 centimeters, as indicated in form No. 2. The layer of broken stone must be rolled and made even with stone of the same size that has been used.

## ROLLING.

ART. 37. The rolling shall be done in preference by a steam roller the weight of which should not be less than 10 tons. After the spreading of the broken stone, the rolling shall commence at the edges and be carried forward in such manner that the roller will be from 5 to 12 centimeters over the walk, and on being brought back the outside edge of the motor roller should be from 12 to 25 centimeters within the edge of the broken stone. The broken stone shall be rolled until no ridges are formed in front of the roller and until it seems firm on walking over it. The other side shall be rolled in the same manner. Afterwards the roller should work toward the center until the roadbed is perfectly solid and satisfactory to the engineer in charge.

## SPRINKLING.

ART. 38. With the exception of such cases that the engineers shall decide in which from the hardness or the nature of the stone it may be necessary to sprinkle the crushed stone, it shall only be sprinkled after the top dressing shall have been spread. The top dressing must be thoroughly sprinkled before rolling, but not to the extent of saturating the foundation; time must be allowed for the water to pass through the top dressing before rolling is commenced.

## TOP DRESSING.

ART. 39. After the macadam shall have become solid, a top dressing of 1 centimeter thickness shall be spread and then rolled, but if the indicated thickness should not be sufficient in the opinion of the engineer in charge of the work, it shall be the duty of the contractor to increase it to the extent necessary for its object.

## VITRIFIED TERRA-COTTA TUBING.

ART. 40. The tubing shall be placed in conformity with the alignment and grades furnished by the engineer in charge. If the tubing to be employed should be more than 50 centimeters in diameter, the extra strong kind will be demanded, and in case the engineer in charge should so deem necessary it shall be laid in hydraulic cement. Care shall be taken that the sockets and their surroundings are covered with hydraulic mortar to the satisfaction of the engineer in charge. The extremities of the drainage pipe used in this class of work shall be protected by a masonry wall made with hydraulic mortar.

## CAST-IRON PIPING.

ART. 41. The piping shall be laid in conformity with the alignment and grades furnished by the engineer in charge. The material that shall be placed underneath and around the pipe shall be loose and free from large stones, and well rammed with an iron rammer of the proper size. The joints in the piping shall be thoroughly made of the best quality of Portland cement, care to be taken that the sockets and their surroundings shall be well covered with cement. The outlets of drain pipes used in this class of work shall be protected by stone walls laid in hydraulic mortar.

## DRY MASON WORK.

ART. 42. The mason work shall be made of stones from the quarry of the size, shape, and proper form for the work being done. The vertical joints for at least every 30 centimeters shall be filled and sufficient small stones shall be placed for the purpose of forming a perfect bond. Loose stones shall only be used when it is necessary to prop up and make the work secure. In the foundation lines stone of larger size shall be used.

## ORDINARY MASON WORK.

ART. 43. In this class of work there shall be employed stone placed by line in a manner that a perfect tie or bond may be secured. The stone shall be laid in layers of sufficiently thick common mortar. They shall be pressed down until firmly bedded and laid in a manner that the vertical joints may be covered, which latter shall be filled with mortar, and into which shall be wedged small stones until all spaces are filled. Small stones shall not be placed into the horizontal joints. The tops shall be left completely smooth, refilling with mortar all the joints.

## ORDINARY MASON WORK WITH HYDRAULIC MORTAR.

ART. 44. This class of work shall be done in conformity with provisions of article 44, with the exception of the use of hydraulic mortar, which will take the place of common mortar. The mixing shall be done in accordance with instructions from the engineer in charge and only in the necessary quantities for immediate use. Mortar which shall not have been used within three-quarters of an hour after it has been mixed with water shall be rejected.

## BRICKWORK.

ART. 45. This work shall be done by placing the brick in layers alternating four lengthwise and one crosswise, joints to be 10 millimeters thick and broken. No cracked or broken brick shall be used and only pieces shall be employed to finish out rows. Before laying, the bricks shall be soaked in water for five minutes. Each brick must be driven firmly into place and care taken that the joint is filled with mortar and the rows laid horizontally.

## MEASUREMENT AND PAYMENT OF WORK.

## METHOD OF PAYMENT FOR GRADINGS.

ART. 46. The gradings in earth and stone by their volume in cubic meters at the prices per unity agreed upon, no matter to what distance the excavated material may have to be taken, either to gradings of earth or stone, or to deposits or dumps, as in the said price is included the cost of all necessary work to complete the excavation and the cost of occupying the lands, if there should be any.

## METHOD OF PAYMENT FOR EARTH AND STONE GRADINGS.

ART. 47. Earth gradings and stone gradings shall be paid for by their volume in cubic meters at the price per unity agreed upon regardless of the point from which the earth or stone is taken for the purpose and of the distances that they may have been hauled; in the said price is included the cost of all the necessary work for finishing a cubic meter of earth or stone grading, as well as the opening of auxiliary ditches and the indemnity for damages that may be caused thereby.

## METHOD OF PAYMENT FOR BUILDING WORK.

ART. 48. Building work shall be paid for by its volume in cubic meters at the price per unity agreed upon, regardless of the point from where the materials come.

## METHOD OF PAYING FOR THE LINEAR METER OF MADE ROADBED.

ART. 49. The roadbed, be it either of macadam or of Telford macadam, shall be paid for by linear meter of the road at the prices per unity agreed upon in the contract. The said prices shall comprise the road edges and all the necessary work for the making and finishing the roadbed in strict accordance with the specifications, and the price shall be unvariable, regardless of the nature and source of the materials employed and of the hauling distances. If any special circumstance should oblige a change to be made in the cross section of the roadbed, the price of the linear meter will vary in the same proportion as the surface of the cross section.

## METHOD OF PAYING FOR TERRA-COTTA AND IRON PIPING.

ART. 50. Vitrified terra-cotta or cast-iron piping shall be paid for per lineal meter at the price per unity agreed upon; in this price is included the cost of ditching and filling in, as well as of all other incidental work, excepting the protecting walls at the outlets.

## FINISHING OF EXCAVATION.

ART. 51. In the prices per unity for excavations and earth and stone gradings is included the cost of finishing the inclines of grades of all kinds.

## DITCHES AND EXCAVATION FOR ROADBED.

ART. 52. Ditches and the opening of the excavation for the roadbed shall be paid for by volume at the price per unity agreed upon for the work.

## LUMBER FOR FINISHING WORK, IRON WORK, AND OTHER LIKE MATERIALS.

ART. 53. The price of lumber, iron work, and other like materials that have to be employed in finishing works comprises the purchase price of the said materials delivered at the work, their fitting, placing, or adjustment in accordance with the plan; consequently in said price is included the cost of transportation, loading, unloading, time lost, and other secondary work.

## EXPLANATION RELATING TO THE WORK OF REMOVAL OF EARTH.

ART. 54. By these stipulations it shall be understood that a cubic meter of earth removed is the said amount of earth in its original condition at the place of excavation; and as a cubic meter of earth or stone grading, that amount of work done in accordance with the stipulations.

## WHAT THE PRICE OF A CUBIC METER OF EXCAVATION COMPRISES.

ART. 55. In the price of a cubic meter of excavation is included the cost of clearing of trees, roots, and all kinds of vegetation.

In the prices of the cubic unity of excavations and earth for stone gradings is included the cost of finishing the inclinations of grades of all kinds.

## DEFINITION OF ROCK.

ART. 56. As rock excavations, only those shall be classified as such which are made in rocky formations that require blasting for the removal of the stone, and where a pick can not be used, as well as the stone moved having a volume greater than 0.5 of

a cubic meter. Stone of less size will be classified and paid for at the price of earth excavation. In rock excavations in the roadbed the depth allowed shall not be greater than 15 centimeters below the lines shown in the cross sections. In ditches the allowable depth for the excavation of stone shall be based upon the breadth of the ditches and 30 centimeters below the bottom shown in the plans or marked out at the spot by the engineer in charge.

## DEFINITION OF A CUBIC METER OF BUILDING WORK.

ART. 57. For the purposes of these specifications, a cubic meter of any kind of building work is to be understood as a cubic meter of work completely finished in accordance with the specifications.

## APPENDIX D.

[Form No. 1.]

[Department of public works of the island of Cuba, district of \_\_\_\_\_, province of \_\_\_\_\_, \_\_\_\_\_, 190—.]

The SECRETARY, *Habana*.

SIR: The following is my personal report for the month of \_\_\_\_\_, 190—:

.....  
 Date forwarded, \_\_\_\_\_.  
 Date of return, \_\_\_\_\_.  
 Absent on duty or by leave, \_\_\_\_\_.  
 Yours, respectfully,

\_\_\_\_\_,  
*Chief Engineer.*

[Form No. 2.]

[Department of public works of the island of Cuba, district of \_\_\_\_\_, province of \_\_\_\_\_, \_\_\_\_\_, 190—.]

The SECRETARY, *Habana*.

SIR: I have the honor to render you account of the public funds on deposit and in cash at the conclusion of the month of \_\_\_\_\_:

Balance of the previous month of .....	\$.....	\$.....
Received during the preceding month .....		\$.....
Paid during the preceding month .....		
Transferred during the preceding month to .....		
Forwarded to the credit of the treasury of the island of Cuba .....		
Total amount to my credit .....		
Distribution of the said amount:		
With depositories:		
.....		
.....		
In checks or drafts .....		
In the safe of the district .....		
In possession of other persons, as follows:		
.....		
In remittances:		
Made to .....		
To receive from .....		
.....		
Total .....		

Yours, respectfully,  
 Examined and approved:

\_\_\_\_\_,  
*Official Paymaster.*

\_\_\_\_\_,  
*Chief Engineer.*

[Indorsement.]

[Form No. 2.]

Monthly statement of public funds in the month of \_\_\_\_\_ of 190—. \_\_\_\_\_, official paymaster.

## REPORT OF MILITARY GOVERNOR OF CUBA.

[Form No. 3.]

[Department of public works of the island of Cuba, district of ———, province of ———.]

*List of employees at the works of ——— during the month of ———, 190—.*

## REGULARLY APPOINTED EMPLOYEES.

Number of order.	Names.	Duties.	Salary.	Amount earned.

## OTHER EMPLOYEES.

Number.	Occupation.	Time or contract by piecework.	At the rate of—	Amount earned.

\_\_\_\_\_  
Chief Engineer.

[Indorsement.]

[Form No. 3.]

Department of public works. Statement of employees on the works of ———, district of ———, province of ———, during the month of ——— of 190—.

[Form No. 3A.]

[Department of public works of the island of Cuba, district of ———, province of ———.]

*List of employees at the work of ———, province of ———, during the month of ———, 190—.*

## REGULARLY-APPOINTED EMPLOYEES.

Number of order.	Names.	Duties.	Salary.	Amount earned.

## OTHER EMPLOYEES.

Number.	Occupation.	Time or contract by piecework.	At the rate of—	Amount earned.

\_\_\_\_\_  
Chief Engineer.

[Indorsement.]

[Form No. 3a.]

Department of public works, statement of employees on the works of ———, district of ———, province of ———, during the month of ———, 190—.



REPORT OF MILITARY GOVERNOR OF CUBA.

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[Form No. 8.]

[Department of public works of the island of Cuba, district of ————, province of ————.]

List of all kinds of material bought during the month of \_\_\_\_\_, 190—, by \_\_\_\_\_, chief engineer, and charged to the assignment of \_\_\_\_\_, and included in the statement of the \_\_\_\_\_, quarter of 190—.

Number of vouchers.	Alphabetical list of the articles.	Designation by kilos, liters, numbers, etc.	Quantity bought.

[Indorsement.]

[Form No. 8.]

Department of public works, monthly statement of material bought for the work of \_\_\_\_\_  
during the month of \_\_\_\_\_, 190-, by \_\_\_\_\_, chief engineer. Included in the statement  
of the \_\_\_\_\_ quarter of 190-.

[Form No. 9.]

[Department of public works of the island of Cuba, district of ——— ———, province of ——— ———.]

*List of all kinds of material bought during the month of \_\_\_\_\_, 190—, by \_\_\_\_\_, chief engineer, and charged to the assignment of \_\_\_\_\_, and included in the statement of the \_\_\_\_\_ quarter of 190—.*

Number of voucher.	Alphabetical list of the articles.	Designation by kilos, liters, numbers, etc.	Quantity bought.

[Indorsement.]

[Form No. 9.]

Department of public works, monthly statement of material bought for the work of \_\_\_\_\_, during the month of \_\_\_\_\_, 190\_\_\_\_, by \_\_\_\_\_, chief engineer. Included in the statement of the \_\_\_\_\_ quarter of 190\_\_\_\_.

[Form No. 10.]

[Department of public works of the island of Cuba, district of ———, province of ———.]

Quarterly list of the material corresponding to the work \_\_\_\_\_ in the quarter ending  
on the \_\_\_\_\_ of \_\_\_\_\_, 190\_\_\_\_, given by \_\_\_\_\_, chief engineer.

[illegible]

## REPORT OF MILITARY GOVERNOR OF CUBA.

Quarterly list of the material corresponding to the work \_\_\_\_\_ in the quarter ending on the \_\_\_\_\_ of \_\_\_\_\_, 190—, given by \_\_\_\_\_, chief engineer—Cont'd.

[Form No. 11.]

How procured.			List of articles.	Designation by kilos, liters, numbers, etc.	In stock according to last statement.	Received during the quarter.	Total to be accounted for.	Decrease during the quarter.	In stock on the _____ of _____, 190—.	Condition of the material.			Cause of reduction.		
By purchase.	By transfer.	_____.								Good.	Repairable.	Useless.	By natural usage.	Used in work.	_____.

[Form No. 12.]

How procured.			List of articles.	Designation by kilos, liters, numbers, etc.	In stock according to last statement.	Received during the quarter.	Total to be accounted for.	Decrease during the quarter.	In stock on the _____ of _____, 190—.	Condition of the material.			Cause of reduction.		
By purchase.	By transfer.	_____.								Good.	Repairable.	Useless.	By natural usage.	Used in work.	_____.

I certify that the preceding list contains the exact quantity of public material in my charge of the said work during the quarter that ended on the \_\_\_\_\_ of \_\_\_\_\_, 190—.

\_\_\_\_\_, Chief Engineer.

[Indorsement.]

[Form No. 12.]

Department of public works, quarterly statement of the material corresponding \_\_\_\_\_, furnished by \_\_\_\_\_, corresponding to the \_\_\_\_\_ quarter \_\_\_\_\_ of 190—.

[Form No. 13.]

[Department of public works of the island of Cuba, district of \_\_\_\_\_, province of \_\_\_\_\_.]

Quarterly list of the material corresponding to the work of \_\_\_\_\_, in the quarter ending on the \_\_\_\_\_ of \_\_\_\_\_, 190—, given by \_\_\_\_\_, chief engineer.

How procured.			List of articles.	Designation by kilos, liters, numbers, etc.	In stock according to last statement.	Received during the quarter.	Total to be accounted for.	Decrease during the quarter.	In stock on the _____ of _____, 190—.	Condition of the material.			Cause of reduction.		
By purchase.	By transfer.	_____.								Good.	Repairable.	Useless.	By natural usage.	Used in work.	_____.

I certify that the preceding list contains the exact quantity of public material in my charge of the said work during the quarter that ended on the \_\_\_\_\_ of \_\_\_\_\_, 190—.

\_\_\_\_\_, Chief Engineer.

[Indorsement.]

[Form No. 13.]

Department of public works, quarterly statement of the material corresponding \_\_\_\_\_, furnished by \_\_\_\_\_, corresponding to the \_\_\_\_\_ quarter \_\_\_\_\_ of 190—.

# REPORT OF MILITARY GOVERNOR OF CUBA.

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[Form No. 17.]

[Department of public works, district of ———, province of ———.]

*Requisition for the necessary funds for the month of ———, 190—.*

Name and date of the allotment.	Amount that will probably be required for the expenses of the month.	Probable balance at the beginning of the month.	Amount which should be forwarded.	Amount approved by the director-general.
Total.....				

The funds will be placed in the depository of ———, to the order of the official paymaster, Mr. ———.

*Chief Engineer.*

— of ———, 190—.

NOTE.—In the letter of remittance should be clearly and concisely stated the manner in which the money asked for is to be used.

[Indorsement.]

[Form No. 17.]

Department of public works, requisition for funds for the month of ———, 190—, chief engineer, district of ———, province of ———. Total required, \$——.

[Department of public works, province of ———. Work of ———.]

*Report of progress of works from ——— to ———, 190—.*

Kind of work.																					
Place of work .....		{																			
Unities of works done:																					
During the fortnight .....																					
Previously .....																					
Total up to date .....																					
		Number.	Dollars.	Cents.	Dollars.	Cents.	Dollars.	Cents.	Dollars.	Cents.	Dollars.	Cents.	Dollars.	Cents.	Dollars.	Cents.	Dollars.	Cents.	Dollars.	Cents.	
Personnel employed .....		{																			
Carts .....																					
Steam rollers .....																					
Material purchased and used .....		{																			
Total cost for fortnight .....																					
Total cost previous .....																					
Total cost up to this date .....																					
Cost per unity of work .....																					

Credit allowed ..... \$.....

Total expenses up to date .....       

Available balance at this date.....       

— of ———, 190—

(Signed) ———,  
(Position) ———.

## REPORT OF MILITARY GOVERNOR OF CUBA.

Report of progress of works from ——— to ———, 190—.

Recapitulation.	Fortnight.		Previous.		Up to this date.	
	Dollars.	Cts.	Dollars.	Cts.	Dollars.	Cts.
General expenses .....						
Total cost according to above statement .....						
Total of expenses .....						

[Indorsement.]

Province of ———, work of ———. Report of progress of works, from ——— to ———, 190—. (Signed) ———. (Position) ———.

[Form No. 18.]

[Department of public works, district of ———, work of ———.]

Monthly report of progress of work, month of ———, 190—.

Kind of work.	Unity.	Executed.			Cost.						Cost per unity of work.			
		In the month.	Previously.	Total at present.	In the month.				Previously.	Total up to date.	In the month.	Previously.	Up to date.	
					Personnel.	Material.	Implements used on work.	—.						Total.
Statement of funds.	Dollars.													
	Cents.													
	Dollars.													
	Cents.													
	Dollars.													
	Cents.													
	Dollars.													
	Cents.													
General expenses.														
Total cost..														
_____ , of _____ , 190—.														
_____ ,														
_____ .														
Credit allowed for the work														
Requisition for funds according to previous statement.....														
Funds received during month .....														
Total expenses according to previous statement....														
Total expenses according to statement for month...														
Report of contracts pending payment .....														
Report of other bills .....														
Balance at disposition of paymaster .....														
Total funds available.....														

[Indorsement.]

[Form No. 18.]

Department of public works, district of ———, work of ———. Monthly report of progress of work, month of ———, 190—. Signature ———. In charge ———.

REPORT OF MILITARY GOVERNOR OF CUBA.

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[Department of public works, work of ——— ———, district of ——— ———, province of ——— ———.]

## Daily report of wages and materials employed and work done.

[Day — of — —, 190—. — —, foreman.]

[illegible]

Signature \_\_\_\_\_,  
In charge \_\_\_\_\_.

[Indorsement.]

Department of public works, district of \_\_\_\_\_, province of \_\_\_\_\_, work of \_\_\_\_\_.  
Daily report of personnel, material, and work done \_\_\_\_\_, \_\_\_\_\_ day \_\_\_\_\_ of \_\_\_\_\_,  
190—.

[Department of public works, work of ——— ———, district of ——— ———, province of ——— ———.]

[Steam roller No. —.]

*Daily report of personnel, material used, and work done.*

[— day — of — —, 190—. — —, machinist.]

[illegible]

NOTE.—Steam rollers must be cleaned externally every day by the watchman. Weekly the water in the boiler shall be changed and the necessary cleaning done.

Habana, ———, 190—.

(Signature) \_\_\_\_\_,

(In charge) \_\_\_\_\_.

Department of public works, district of \_\_\_\_\_, province of \_\_\_\_\_. Steam roller No. \_\_\_\_\_.  
 Work of \_\_\_\_\_. Daily report of personnel, material used, and work done \_\_\_\_\_, day  
 \_\_\_\_\_ of \_\_\_\_\_, 190-.

Department of public works, district of \_\_\_\_\_, province of \_\_\_\_\_. Stone crusher No. \_\_\_\_\_.  
Work \_\_\_\_\_. Daily report of personnel, material, used and work done, \_\_\_\_\_, day \_\_\_\_\_  
of \_\_\_\_\_, 190-.

This report shall be in the office of the work at 9 o'clock in the morning of the day following that to which it refers.

[Proposal of ———, No. ——— for ——— to be opened ———.]

————, 190—.

Sealed proposals to furnish the articles hereinafter mentioned will be received by the undersigned until ——— p. m. on the ——— of ———, 190—, at ———.

Blank forms and information will be furnished to those soliciting same. The proposals are to be made in triplicate and forwarded in sealed envelope addressed to the undersigned, stating on the back that it is a proposal which should be opened in public on the date and hour named.

At equal cost and conditions, articles of home production will be preferred. Custom-house duties should be included in the prices of foreign articles.

The department of public works reserves the right to reject any or all the proposals.

The articles or materials must conform with the expressed conditions.

(Signature) ———.  
(Position) ———.

(Date) ———, 190—.

Mr. ———,  
*Department of Public Works.*

SIR: The undersigned, in reply to the foregoing request, hereby offers to sell to the department of public works any or all of the following articles asked for, in large or small quantity, at the prices marked on each one, at such time and in such quantity as you may order; and in case this proposal should be accepted the articles will be furnished and delivered, free of transportation or any other charges, on ———.

We guarantee that the articles will be exactly the same as those demanded, and we bind ourselves to take back at our expense all those articles not acceptable to the engineer in charge owing to their not being in conformity with the conditions.

We bind ourselves to deliver the articles on or before ———, 190—; and this proposal, in case it is accepted, remains in force for a period of ——— months from the date of acceptance.

(Signed) ———,  
(Address) ———.

Articles.	Conditions that must be complied with.	Amount.	Place of delivery.	Price per unity, American gold.	
				Dollars.	Cts.

[Proposal of ———, No. ———, for ———, to be opened ———.]

#### ADVERTISEMENT.

———— of ———, 190—.

Office of the District of ———,  
Street ———, No. —.

Until ——— of the ——— of ———, 190—, sealed proposals will be received at this office for ———.

Blank forms and information will be furnished to those soliciting same.

(Signature) ———.  
(Position) ———.

Date ———, 190—.

Mr. ———,  
*Department of Public Works.*

SIR: The undersigned, being aware by the preceding advertisement, hereby offers to sell to the department of public works any or all of the following articles, in large or small quantity as you may order, at the prices marked on each one; and in case this proposal should be accepted the articles will be furnished and delivered, free of transportation or any other charges, on ———.

We guarantee that the articles will be exactly the same as those demanded, and we bind ourselves to take back at our expense all those articles not acceptable to the engineer in charge owing to their not being in conformity with the conditions.

We bind ourselves to deliver the articles on or before ———, 190—, and this proposal, in case it is accepted, remains in force for a period of ——— months from the date of acceptance.

(Signed) ———,  
(Address) ———.

Articles.	Conditions that must be complied with.	Amount.	Place of delivery.	Price per unity, American gold.	
				Dollars.	Cents.

[Proposal of ———, No. ———, for piles of crushed stone ———, to be opened ———.]

————, 190—

Sealed proposals to furnish crushed stone will be received by the undersigned until ——— p. m. on the ——— of ———, 190—, at ———.

Blank forms and information will be furnished to those soliciting same. The proposals are to be

made in triplicate, and forwarded in sealed envelope addressed to the undersigned, writing on the back that it is a proposal which should be opened in public on the date and hour named.

The department of public works reserves the right to reject any or all the proposals.

The crushed stone must conform with the expressed conditions.

(Signature) \_\_\_\_\_,  
(Position) \_\_\_\_\_.

(Date) \_\_\_\_\_, 190—.

Mr. \_\_\_\_\_,  
*Department of Public Works.*

SIR: The undersigned, in reply to the foregoing request, hereby offers to sell to the department of public works crushed stone, in large or small quantity, at the prices marked for each one at such time and quantity as you may order, and in case this proposal should be accepted the stone will be furnished and delivered, free of transportation or any other charges, on \_\_\_\_\_.

We guarantee that the stone will be exactly the same as that demanded, and we bind ourselves to take back at our expense all the stone not acceptable to the engineer in charge owing to its not being in conformity with the conditions.

We bind ourselves to deliver the stone on or before \_\_\_\_\_, 190—, and this proposal, in case it is accepted, remains in force for a period of \_\_\_\_\_ months from the date of acceptance.

(Signed) \_\_\_\_\_,  
(Address) \_\_\_\_\_.

Conditions to be complied with.	Amount.	Quarry.	Place of delivery. Kilometers.	Price per unity, American gold.	
	Cubic meters.			\$	Cts.
Art. 1.—The contractor binds himself to pile the number of cubic meters of stone herein specified, and in the manner provided for in this contract.					
Art. 2.—The stone which is to be piled must be of the best quality and must be taken from the quarries and places herein stated.					
Art. 3.—The stone shall be crushed in such a manner that the fragments will not exceed _____ centimeters in size; the contractor must subject himself in this particular to the tests the engineer may decide upon in each case, in order to insure the fulfillment of this condition; the stone after being crushed must be free of dust, earth, and any other substance which might prove injurious to its use, including "gravel," the maximum dimension of which must be less than to _____ centimeters.					
Art. 4.—The crushing of the stone will be made outside of the road line, excepting in those cases where in the judgment of the engineers this is not possible.					
Art. 5.—The measurement of the stone will be made by the number of carts, which should be conveniently prepared in such manner that the capacity of each will be exactly 1, $1\frac{1}{4}$ , or 2 cubic meters; this will be attested to by the engineer or his deputy, who will reject any that does not combine this condition. The engineer or his deputy will designate the person who shall receive the stone in the road, from whom only the regular working hours can be exacted for the fulfillment of this work; therefore, all piling done by the contractor during the absence of said deputy will not be credited to him until the measurement has been effected for his account, making use of the metric boxes which will be furnished, and in the presence of the same. The stone shall be piled on the paths of the kilometer for which the stone is intended, in piles the size of which will be determined by the engineer, placed in the manner and distance that he may decide.					
Art. 6.—By a cubic meter of stone for these piles is meant the volume of the material mentioned, crushed, necessary to fill a box one meter in length by one in width and height.					
Art. 7.—The contractors shall begin to pile within the term of _____ days from the date of contract.					
Art. 8.—The contractor shall place on the road _____ cubic meters as a maximum, in the places and kilometers ordered. At the end of the month the stone piled will be examined in order to ascertain whether it is the amount stipulated and whether it complies with the conditions. The decision of the engineer in charge regarding the quantity and quality of the stone piled shall be final.					
Art. 9.—The contractor will be credited monthly with the amount of stone received.					



[Proposal of \_\_\_\_\_, No. \_\_\_\_\_, for piles of crushed stone \_\_\_\_\_, to be opened \_\_\_\_\_.]

## ADVERTISEMENT.

\_\_\_\_\_ of \_\_\_\_\_, 190—.  
Office of the District of \_\_\_\_\_,  
Street \_\_\_\_\_, No. \_\_\_\_\_.

Until \_\_\_\_\_ of the \_\_\_\_\_ of \_\_\_\_\_, 190—, sealed proposals will be received at this office for \_\_\_\_\_.

Blank forms and information will be furnished to those soliciting same.

(Signature) \_\_\_\_\_,  
(Position) \_\_\_\_\_.

(Date) \_\_\_\_\_, 190—.

Mr. \_\_\_\_\_,  
*Department of Public Works.*

SIR: The undersigned, being aware by the preceding advertisement, hereby offers to sell to the department of public works crushed stone in large or small quantity at the prices marked, at such time and quantity as you may order, and in case this proposal should be accepted the stone will be furnished and delivered free of transportation or any other charges on \_\_\_\_\_.

We guarantee that the stone will be exactly the same as that demanded, and we bind ourselves to take back at our expense all the stone not acceptable to the engineer in charge owing to its not being in conformity with the conditions.

We bind ourselves to deliver the stone on or before \_\_\_\_\_, 190—, and this proposal, in case it is accepted, remains in force for a period of \_\_\_\_\_ months from the date of acceptance.

(Signed) \_\_\_\_\_,  
(Address) \_\_\_\_\_.

Conditions to be complied with.	Amount.	Quarry.	Place of delivery. Kilometers.	Price per unity, American gold.	
	Cubic meters.			\$	Cts.
Art. 1.—The contractor binds himself to pile the number of cubic meters of stone herein specified, and in the manner provided for in this contract.					
Art. 2.—The stone which is to be piled must be of the best quality and must be taken from the quarries and places herein stated.					
Art. 3.—The stone shall be crushed in such a manner that the fragments will not exceed _____ centimeters in size; the contractor must subject himself in this particular to the tests the engineer may decide upon in each case, in order to insure the fulfillment of this condition; the stone after being crushed must be free of dust, earth, and any other substance which might prove injurious to its use, including "gravel," the maximum dimension of which must be less than _____ centimeters.					
Art. 4.—The crushing of the stone will be made outside of the road line, excepting in those cases where in the judgment of the engineers this is not possible.					
Art. 5.—The measurement of the stone will be made by the number of carts, which should be conveniently prepared in such manner that the capacity of each will be exactly 1, 1½, or 2 cubic meters; this will be attested to by the engineer or his deputy, who will reject any that does not combine this condition. The engineer or his deputy will designate the person who shall receive the stone in the road, from whom only the regular working hours can be exacted for the fulfillment of this work; therefore, all piling done by the contractor during the absence of said deputy will not be credited to him until the measurement has been effected for his account, making use of the metric boxes which will be furnished, and in the presence of the same. The stone shall be piled on the paths of the kilometer for which the stone is intended, in piles the size of which will be determined by the engineer, placed in the manner and distance that he may decide.					
Art. 6.—By a cubic meter of stone for these piles is meant the volume of the material mentioned, crushed, necessary to fill a box one meter in length by one in width and height.					
Art. 7.—The contractors shall begin to pile within the term of _____ days from the date of contract.					
Art. 8.—The contractor shall place on the road _____ cubic meters as a maximum, in the places and kilometers ordered. At the end of the month the stone piled will be examined in order to ascertain whether it is the amount stipulated and whether it complies with the conditions. The decision of the engineer in charge regarding the quantity and quality of the stone piled shall be final.					
Art. 9.—The contractor will be credited monthly with the amount of stone received.					

[Form No. 20.]

[Department of public works of the island of Cuba. Proposition for———.]

To ———, ———, 190—.

SIR: In conformity with your advertisement of ———, 190—, requesting bids for ———, subject to all the requirements and conditions expressed therein, and with your ——— dated ———, 190—, of which copies are inclosed, which, in so far as they relate to this bid, form part of the same, we (or I) propose:

We (or I) make this offer with the full knowledge of the class, amount, and kind of the articles that are required and, should it be accepted, we (or I) will enter into a contract within the prescribed time in accordance with the required conditions after receiving written notice that the said bid has been accepted, furnishing ample and sufficient security for the faithful performance of the same.

We (or I) inclose ——— for the sum of ——— (\$——) as a guarantee that this bid is made in good faith, which sum shall be taken possession of by the government of Cuba as a payment for losses and damages in case that the before-mentioned contract should not be duly executed by us (or by me.)

(Signature) ———,  
(Address) ———.  
(Signature) ———,  
(Address) ———.

(To be signed in triplicate.)

[Form No. 21.]

[Department of public works of the island of Cuba. Contract.]

1. By virtue of this contract entered into on this date ——— of ———, 190—, by Mr. ———, party of the first part, chief engineer of the district of ———, province of ——— (island of Cuba), and by ———, party of the second part, of ———, in the province of ———, it is agreed that, in conformity with the advertisement of proposals, a copy of which is hereunto attached and forms an integral part of this contract, the aforesaid ———, in the name and representation of the government of the island of Cuba, and the said ———, agree and mutually covenant the following:

2. Before the supplies which may have been furnished and the work which may have been done in accordance with the conditions of this contract are accepted both the former and the latter shall be subjected to a careful examination to be made by an inspector designated by the government, and those which do not fulfill the requirements that are stipulated in this contract shall be refused. Against the decision of the engineer charged with the matter as to quality and quantity no appeal may be made.

3. The aforesaid ——— shall commence the ——— herein stipulated within ——— (——) days after the day on which he may have been notified of the approval of the contract by the secretary of public works, and will finish the same within ——— (——) from and after the date of his having commenced the same.

4. Whenever from any circumstance the contractor should delay the delivery of materials or not commence the work on the day herein specified, or in the opinion of the engineer in charge the work is being done without strict observance to the required conditions and to the clauses of this contract, the first named of the contracting parties or whoever may legally substitute him is hereby authorized, with the approval of the secretary of public works, to rescind or annul the contract by means of a notification in writing sent for the purpose to the contractor, should there be only one, or to each and every one of the contractors, should there be more than one, and from the time in which said notification is made all payments that by virtue of this contract should be made to the contractor or contractors shall be suspended, the first named of the contracting parties withholding until the termination and final approval of the works herein stipulated all reservable sums of money or percentage which by virtue of this contract may or might be owing to the contractor or contractors, the government having the right to cause them to reimburse all sums of money that the first named of the contracting parties might be obliged to expend in excess of the stipulated price for the conclusion of the work, as well as of all inspection and direction expenses incurred by the said government in excess of those which it would have had to pay during the period stipulated by the contract for the completion of the work. The first named of the contracting parties may deduct all the sums before mentioned from the reservable amounts or percentages before stated, and is authorized as soon as the notification above referred to is made, and if in his opinion the convenience of the public service demands the immediate execution of the work or the delivery of material, to proceed to purchase the latter or carry out the former by contract.

It is agreed, however, that if the contractor or contractors should not be able to commence or finish the work or deliver the materials on the date agreed upon in this contract by reason either of epidemics, inundations, local or general quarantine restrictions, restraint of rulers, violence of the elements, or other unavoidable cause of delay, and for which he or they are not to blame, they may be granted, conditional with the approval in writing of the secretary of public works, the extension of time which in the judgment of the first of the contracting parties or his successor may be just and sufficient for the commencement and termination of the work, without the fact, however, changing in any manner the other terms of this contract.

5. It is agreed and especially stipulated in a like manner that the periods named shall be considered an essential condition of this contract, and that in the case of the contractor not complying therewith in conformity with the conditions specified and agreed upon he shall pay to the government of the island of Cuba the sum of ——— dollars (\$——), United States money, for each day that he should delay the termination of this contract, it being hereby agreed upon between the contracting parties that the said daily sum of ——— dollars (\$——), United States money, shall be in the nature of an

indemnity for the losses and injuries suffered by the said government by virtue of said delay and nonfulfillment of contract, and not in the nature of a penalty, and that said government shall have the right to obligate the contractor or contractors to reimburse all expenses of inspection and direction that the former may incur by reason of the delay, as well as of all amounts that in order to cause the fulfillment of the contract the first of the contracting parties might have to disburse in excess of the price to be paid to the contractor or contractors as herein stipulated.

The first of the contracting parties may deduct or withhold all the above mentioned amounts to any extent, or the reservable percentage which by virtue of this contract is owing or may be owing to the contractors.

6. If at any time during the period that the work is being done, the government should deem it advantageous or necessary to make any change or modification in the plan that would render necessary a change in the general conditions as to the character of the work and the amount, either of labor or materials, that would cause an increase or reduction in the cost of the work, the contracting parties in such case shall agree upon the said change or modification in writing, expressly stating in said agreement the reasons whereon the said change or modification has been made, clearly stating the amounts and the prices of materials and work substituted for those agreed upon in the original contract, no payment whatever to be made to the contractor until after the said supplement or modification of contract has been signed by the contracting parties and approved by the secretary of public works.

7. At no time whatsoever may the contractors make any claim against the island of Cuba for additional work done or for any excess of supplies furnished, alleging therein that the same had been done or furnished by virtue of this contract, if the provisions of the preceding article have not been complied with.

8. For all obligations entered into for labor and materials during the course of the work the contractors shall be responsible, and the payment for the same shall be made by them.

9. The contracting parties in a like manner agree that until the inspection, approval, and definite payments for material and work herein stipulated shall have been made no inspection, payment, or any former act shall be considered as an abandonment of the right that the government has of refusing to accept all defective work or material or of exacting the compliance with any clause whatsoever of this contract.

10. The contracting parties furthermore agree and obligate themselves to free the government of the island of Cuba from all responsibility arising from the use of any invention, article, or method protected by patent that may have been employed in combination with the materials which in this contract it is agreed shall be furnished and in the work to be carried out by virtue of this contract.

11. Payments shall be made to the said ——— in conformity with the provisions of the general conditions, when ——— contracted for are finished and accepted, the sum of ——— (———) per cent of each payment to be reserved until all ——— shall have been in a like manner finished and accepted.

12. This contract shall not be transferable to other parties, neither in whole or in part, and should any transfer be made the government may object to the fulfillment of the contract by either the transferring parties or those to whom it was transferred, the government of the island of Cuba reserving all its rights and actions in case that said ——— should violate any of the conditions agreed upon in this contract.

13. No person belonging to or employed in the service of the department of public works shall have participation in this contract nor in the benefits arising from the same.

14. This contract shall not be effective until it is approved by the secretary of public works.

In witness whereof the contracting parties hereunto affix their signatures on the date above mentioned.

Witnesses:

\_\_\_\_\_ for \_\_\_\_\_  
 \_\_\_\_\_ for \_\_\_\_\_  
 \_\_\_\_\_ for \_\_\_\_\_  
 \_\_\_\_\_ for \_\_\_\_\_

(Issued in quintuplicate.)

Approved \_\_\_\_\_ 190—

Examined and found correct:

\_\_\_\_\_  
*Secretary of Public Works.*  
 \_\_\_\_\_  
*Director-General.*

(1) I solemnly swear that the foregoing is a true copy of the contract entered into personally by me with \_\_\_\_\_; that I honestly executed the same, without benefit or profit to myself nor acceding through bribe to give any benefit or profit to said \_\_\_\_\_ nor to any other person; and that the attached documents comprise all those that have relation to the said contract, in the manner required by the rulings issued for the purpose.

(Signature) \_\_\_\_\_  
 (Position held) \_\_\_\_\_  
 (Engineer making the contract.)

(1) This declaration is only required on one of the copies of the contract made in quintuplicate to be sent to the office of \_\_\_\_\_.

NOTE.—There should accompany the copy of the contract for the director-general's office a recapitulation of the proposals and a copy of this bid and advertisement, unless the same has already been sent thereto.

NOTE.—The name of the party that is to obligate itself as contractor, be it either an individual, a firm, or an incorporated company, must be inserted and signed in the contract. An agent of a corporation, a partner, or an agent who signs for his principal, must add their name and official position after the word "for" and beneath the name of the principal; and an agent of a principal or a functionary of the same, should the principal be an incorporated company, must present proof of his official position.

[Indorsement.]

[Form No. 21.]

Contract entered into on \_\_\_\_\_, 190—, between \_\_\_\_\_, of the first part, and \_\_\_\_\_ for \_\_\_\_\_.

[Form No. 22.]

[Department of public works of the island of Cuba. Contractor's bond.]

[In case where the contractor is a private individual or a firm and the bondsmen private individuals.]

It is hereby made known that the undersigned, (1) \_\_\_\_\_ of \_\_\_\_\_, as contractor, and \_\_\_\_\_ of \_\_\_\_\_ in the jurisdiction of \_\_\_\_\_, province of \_\_\_\_\_ and \_\_\_\_\_ of \_\_\_\_\_, in the jurisdiction of \_\_\_\_\_, province of \_\_\_\_\_, as bondsmen, we bind and obligate ourselves to the government of the island of Cuba in the sum of \_\_\_\_\_ dollars, United States money, in the nature of a penalty, firmly obligating ourselves hereby and collectively obligating our heirs and assigns to the prompt and exact payment of said sum.

Given under our hands and seal on this \_\_\_\_\_ day of \_\_\_\_\_, 190-.

By virtue of the nature of this bond, which the above-mentioned \_\_\_\_\_ has entered into on the \_\_\_\_\_ day of \_\_\_\_\_, 190-, with the government of the island of Cuba, represented by \_\_\_\_\_ for \_\_\_\_\_, the parties hereto agree that the foregoing bond shall be null and void if said \_\_\_\_\_, heirs, assigns, or administrators should duly and fully observe and execute in every manner all agreements, stipulations, and conditions that may be entered into or agreed upon in this instrument by said \_\_\_\_\_, fulfilling them in accordance with the true spirit and purpose of said contract with the same effect during any extension of time that in said contract might be granted by the government of the island of Cuba, as during the original period specified in the same, and should \_\_\_\_\_, in addition thereto, pay promptly and punctually all moneys that may be owing to the persons who supply (2) \_\_\_\_\_ with labor or materials in the course of the work stipulated in the said contract; but if the contrary should be the case the aforesaid bond shall continue to be in full force and vigor.

In the presence of:

\_\_\_\_\_ for \_\_\_\_\_ (3).  
 \_\_\_\_\_ for \_\_\_\_\_ (3).  
 \_\_\_\_\_ for \_\_\_\_\_ (3).  
 \_\_\_\_\_ for \_\_\_\_\_ (3).

City of \_\_\_\_\_,

Province of \_\_\_\_\_.

I, the undersigned \_\_\_\_\_, in my character as one of the sureties named in this bond, swear that I possess funds to the extent of \_\_\_\_\_ dollars, United States money, in excess of all my debts and obligations.

Signed and sworn to before me, this \_\_\_\_\_ day of \_\_\_\_\_, 190-, at \_\_\_\_\_,  
 \_\_\_\_\_ (4),

City of \_\_\_\_\_,

Province of \_\_\_\_\_.

I, the undersigned \_\_\_\_\_, in my character as one of the sureties named in this bond, swear that I possess funds to the extent of \_\_\_\_\_ dollars, United States money, in excess of all my debts and obligations.

Signed and sworn to before me, this \_\_\_\_\_ day of \_\_\_\_\_, 190-, at \_\_\_\_\_,  
 \_\_\_\_\_ (4),

(5) The undersigned, as representative of the government, accepts, in favor of the latter, the bond furnished by \_\_\_\_\_, whom he considers duly qualified for the execution of the same.

(Signature) \_\_\_\_\_,  
 (Position held) \_\_\_\_\_.

The undersigned, as representative of the government, accepts, in favor of the latter, the bond furnished by \_\_\_\_\_, whom he considers duly qualified for the execution of the same.

(Signature) \_\_\_\_\_,  
 (Position held) \_\_\_\_\_.

(Issued in duplicate.)

(1) Should the contracting party be a firm, the names of the partners shall be inserted under proof that they are the persons constituting the firm, which shall be also named, the guarantee to comprise all the members.

(2) Singular or plural.

(3) Place of an attachable seal.

(4) The oath must be taken before a notary public or some other functionary duly authorized to administer oaths in general. Should the functionary habitually use an official seal, it should not be omitted in this case; otherwise it will be proper to attach a certificate of his official character.

(5) This certificate should be issued by the chief engineer signing the contract. Should the public functionary be able to certify as to both bondsmen, it will not be necessary to fill in the second blank.

[Indorsement.]

[Form No. 22.]

Bond for fulfillment of contract with \_\_\_\_\_, dated \_\_\_\_\_, 190-, for \_\_\_\_\_.

[Form No. 23.]

[Department of public works of the island of Cuba. Contract bond.]

[When the contracting party is a private individual or a firm and the bond is furnished by an incorporated company.]

It is hereby made known that the undersigned (1) \_\_\_\_\_, of \_\_\_\_\_, as contractor \_\_\_\_\_ and the company known as \_\_\_\_\_, an incorporated company constituted in accordance with

the laws of \_\_\_\_\_, as surety, hereby bind and obligate ourselves to the government of the island of Cuba in the sum of \_\_\_\_\_ dollars, United States money, in the nature of a penalty, firmly obligating ourselves hereby and collectively obligating our heirs and assigns to the prompt and exact payment of the said sum.

By virtue of the nature of this bond which the above-mentioned \_\_\_\_\_ has entered into on this \_\_\_\_\_ day of \_\_\_\_\_, 190\_\_\_\_, with the government of the island Cuba, represented by \_\_\_\_\_, for \_\_\_\_\_, the parties hereto agree that the foregoing bond shall be null and void if the said \_\_\_\_\_, heirs, assigns, or administrators, shall duly and fully observe and execute, in every manner, all agreements, stipulations, and conditions that may be entered into or agreed upon in this instrument by said \_\_\_\_\_ fulfilling them in accordance with the true spirit and purpose of said contract with the same effect during any extension of time that in the said contract might be granted by the government of the island of Cuba, as during the original period specified in the same, and should \_\_\_\_\_ in addition thereto pay promptly and punctually all moneys that may be owing to the persons who supply (2) \_\_\_\_\_ with labor or material in the course of the work stipulated in the said contract, but if the contrary should be the case, the aforesaid bond shall continue to be in full force and vigor.

By virtue whereof the parties hereto execute this instrument on this \_\_\_\_\_ day of \_\_\_\_\_, 190\_\_\_\_, placing therein its title and official stamp of the corporation furnishing the bond, its (3) \_\_\_\_\_ duly attaching his signature hereunto, according to agreement, in its (4) \_\_\_\_\_ approved on the \_\_\_\_\_ day of \_\_\_\_\_, 190\_\_\_\_, a copy of which act is at the arch'v'e of the department of public works.

In the presence of:

\_\_\_\_\_ for \_\_\_\_\_ (5).  
 \_\_\_\_\_ for \_\_\_\_\_ (5).  
 \_\_\_\_\_ (6).  
 \_\_\_\_\_ for \_\_\_\_\_.

(Issued in duplicate.)

(1) Should the contractor be a firm, the names of its members shall be inserted, under proof that they are the persons that constitute it, the names of which shall also be given, the guarantee to comprise all of the members.

(2) Plural or singular.

(3) The president or authorized official to sign in the name of the corporation.

(4) The board or other administrative body of the corporation.

(5) Attached stamps or seals.

(6) Use official stamp.

[Indorsement.]

[Form No. 23.]

Bond for fulfillment of contract with \_\_\_\_\_, dated \_\_\_\_\_, 190\_\_\_\_, \_\_\_\_\_.

[Form No. 24.]

[Department of public works of the island of Cuba. Contract bond.]

When the contracting party is an incorporated company and the bond is furnished by private individuals.

It is hereby made known that the undersigned, the corporation known as \_\_\_\_\_, an incorporated company organized under the laws of \_\_\_\_\_, as contractor, and \_\_\_\_\_, of \_\_\_\_\_, province of \_\_\_\_\_, and \_\_\_\_\_ of \_\_\_\_\_, province of \_\_\_\_\_ as surety, hereby bind and obligate ourselves to the government of the island of Cuba in the sum of \_\_\_\_\_ dollars, United States money, in the nature of a penalty, firmly obligating ourselves hereby and collectively obligating our heirs and assigns to the prompt and exact payment of the said sum.

By virtue of the nature of this bond which the above-mentioned \_\_\_\_\_ has entered into on this \_\_\_\_\_ day of \_\_\_\_\_, 190\_\_\_\_, with the government of the island of Cuba, represented by \_\_\_\_\_ for \_\_\_\_\_, the parties hereto agree that the foregoing bond shall be null and void if the said \_\_\_\_\_ shall duly and fully observe and execute in every manner all agreements, stipulations, and conditions that may be entered into or agreed upon in this instrument by said \_\_\_\_\_, fulfilling them in accordance with the true spirit and purpose of said contract with the same effect during any extension of time that in the said contract might be granted by the government of the island of Cuba as during the original period specified in the same, and should \_\_\_\_\_ in addition thereto pay promptly and punctually all moneys that may be owing to the persons who supply (1) \_\_\_\_\_ with labor or materia in the course of the work stipulated in the said contract, but if the contrary should be the case the aforesaid bond shall continue to be in full force and vigor.

By virtue whereof the parties hereto execute this instrument on this \_\_\_\_\_ day of \_\_\_\_\_, 190\_\_\_\_, placing therein its title and official stamp of the corporation furnishing the bond, its (2) \_\_\_\_\_ duly attaching his signature hereunto, according to agreement, in its (3) \_\_\_\_\_ approved on the \_\_\_\_\_ day of \_\_\_\_\_, 190\_\_\_\_, a copy of which act is at the archives of the department of public works.

In the presence of:

\_\_\_\_\_ for \_\_\_\_\_ (4).  
 \_\_\_\_\_ for \_\_\_\_\_ (4).  
 \_\_\_\_\_ (5).  
 \_\_\_\_\_ for \_\_\_\_\_.  
 \_\_\_\_\_ for \_\_\_\_\_.

(Issued in duplicate.)

(1) Plural or singular.

(2) The president or authorized official to sign in the name of the corporation.

(3) The board or other administrative body of the corporation.

(4) Attached stamps or seals.

(5) Use official stamp.

City of \_\_\_\_\_,

Province of \_\_\_\_\_.

I, the undersigned \_\_\_\_\_, in my character as one of the bondsmen designated in this contract of bond, swear that I possess funds to the extent of \_\_\_\_\_ dollars, United States money, over and above all my debts and obligations.

Signed and sworn to before me, on this \_\_\_\_\_ day of \_\_\_\_\_, 190—, at \_\_\_\_\_, \_\_\_\_\_ (5), \_\_\_\_\_.

City of \_\_\_\_\_,

Province of \_\_\_\_\_.

I, the undersigned \_\_\_\_\_, in my character as one of the bondsmen designated in this contract of bond, swear that I possess funds to the extent of \_\_\_\_\_ dollars, United States money, over and above all my debts and obligations \_\_\_\_\_.

Signed and sworn to before me, on this \_\_\_\_\_ day of \_\_\_\_\_, 190— at \_\_\_\_\_, \_\_\_\_\_ (5), \_\_\_\_\_.

(6) The undersigned, as representative of the government, hereby accepts, in favor of the latter, the bonds furnished by Mr. \_\_\_\_\_ and Mr. \_\_\_\_\_, whom I consider sufficiently qualified to execute the same.

(Signature) \_\_\_\_\_,  
(Position held) \_\_\_\_\_.

(6) The undersigned, as representative of the government, hereby accepts, in favor of the latter, the bonds furnished by Mr. \_\_\_\_\_ and Mr. \_\_\_\_\_, whom I consider sufficiently qualified to execute the same.

(Signature) \_\_\_\_\_,  
(Position held) \_\_\_\_\_.

(Issued in duplicate.)

- (1) The president or officer authorized to sign for the corporation.
- (2) The board of directors or any other administrative board of the corporation.
- (3) Place here the official seal.
- (4) Attach seal.
- (5) The oath shall be taken before a notary public or some functionary that is duly qualified to administer oaths in general; he should use his official seal if he has one, otherwise it will be proper to attach a certificate as to his official character.
- (6) This acceptance must be issued by the engineer in charge who makes the contract. If the functionary is able to certify as to both bondsmen, it will not be necessary to fill in the second form.

[Indorsement.]

[Form No. 24.]

Bond for the fulfillment of the contract with \_\_\_\_\_, dated \_\_\_\_\_, 190—.

[Form No. 25.]

[Department of public works of the island of Cuba. Contract bond.]

[When the contractor and bondsman are both incorporated companies.]

It is hereby made known that the undersigned, the company known as the \_\_\_\_\_, an incorporated company, organized under the laws of \_\_\_\_\_, as the contractor, and the company known as \_\_\_\_\_, an incorporated company, organized under the laws of \_\_\_\_\_, as bondsman, hereby bind and obligate ourselves to the government of the island of Cuba for the sum of \_\_\_\_\_ dollars, United States money, in the nature of a penalty, firmly binding ourselves hereby and obligating our successors collectively to the punctual and exact payment of said sum.

By virtue of the nature of this obligation that the aforesaid \_\_\_\_\_ has contracted on \_\_\_\_\_ of \_\_\_\_\_, 190—, with the government of the island of Cuba, represented by \_\_\_\_\_ for \_\_\_\_\_, the parties hereto agree that this obligation shall become null and void if said \_\_\_\_\_ should faithfully and fully observe and execute in all senses such agreements, stipulations, and conditions entered into and agreed upon in this instrument by said \_\_\_\_\_, fulfilling them in accordance with the true spirit and purpose of said contract to the same effect during any extension of time that the government of the island of Cuba may grant in said contract, as during the original period of the same; and if in addition thereto it shall pay with exactness and punctuality all moneys due the persons that supply it with labor or materials during the course of the stipulated works in the said contract; otherwise the said obligation shall be maintained in its full force and vigor.

In testimony whereof this instrument is executed on the \_\_\_\_\_ day of \_\_\_\_\_, 190—, its (1) \_\_\_\_\_ duly attaching thereto the name and official seal of the said contracting corporation in accordance with action taken by its (2) \_\_\_\_\_, approved on \_\_\_\_\_ of \_\_\_\_\_, 190—, a copy of which act is hereunto attached, and in a like manner attaching to this instrument the name and official stamp of the corporation furnishing the bond in due form by its (1) \_\_\_\_\_, in accordance with action taken by its (2) \_\_\_\_\_, approved on \_\_\_\_\_ of \_\_\_\_\_, 190—, a copy of which act is filed in the archives of the secretary of public works.

Attest:

\_\_\_\_\_ (3).  
For \_\_\_\_\_.

Attest:

\_\_\_\_\_ (3).  
For \_\_\_\_\_.

(Issued in duplicate.)

- [1] The president or functionary authorized to sign for the corporation.
- [2] The board or some administrative body of the corporation.
- [3] Place here company seals.

[Indorsement.]

[Form No. 25.]

Bond for fulfillment of the contract with \_\_\_\_\_, dated \_\_\_\_\_, 190—, for \_\_\_\_\_.

[Form No. 26.]

[Department of public works of the island of Cuba. Contract bond.]

[When the contractor is a private individual or a firm, and the bond is furnished by means of a certified check.]

It is hereby made known that \_\_\_\_\_, the undersigned (1), \_\_\_\_\_, of \_\_\_\_\_, province of \_\_\_\_\_, as contractor, bind \_\_\_\_\_ and obligate \_\_\_\_\_ with the government of the island of Cuba for the sum of \_\_\_\_\_ (\$\_\_\_\_), in United States money, of which delivery is made in the form of a certified check No. \_\_\_\_\_, on the \_\_\_\_\_ bank of the city of \_\_\_\_\_, payable to the order of the secretary of public works in the nature of a penalty, hereby binding \_\_\_\_\_ and obligating our heirs and assigns collectively to the punctual and exact payment of said sum.

By virtue of the nature of this obligation that the above-mentioned \_\_\_\_\_ ha— contracted on the \_\_\_\_\_ day of \_\_\_\_\_, 190—, with the government of the island of Cuba, represented by \_\_\_\_\_, for \_\_\_\_\_, it is agreed that the same shall become null and void and the before-mentioned certified check returned to the contractor, if said \_\_\_\_\_ heirs, assigns, or administrators should duly and fully observe and execute, in every sense, all agreements, stipulations, and conditions entered into and agreed upon in this instrument by said \_\_\_\_\_ fulfilling them according to the true spirit and purpose of said contract to the same effect during any extension of time that the government of the island of Cuba might grant in the said contract as during the original period stipulated in the same, and payment in addition thereto be made with promptness and exactness of all moneys due to persons who may have furnished the labor and material during the course of the work stipulated in the aforesaid contract; otherwise the said obligation shall be maintained in full force and vigor.

In witness whereof this document is signed on this \_\_\_\_\_ day of \_\_\_\_\_ 190—

Witness:

\_\_\_\_\_ for \_\_\_\_\_ (2).  
 \_\_\_\_\_ for \_\_\_\_\_ (2).  
 \_\_\_\_\_ for \_\_\_\_\_ (2).  
 \_\_\_\_\_ for \_\_\_\_\_ (2).

(Signed in duplicate.)

[1] If the contractor is a firm the names of its members shall be inserted under proof that they are really the members thereof, the name of which shall be also inserted, the guarantee to comprise all its members.

[2] Attach seal.

[Indorsement.]

[Form No. 26.]

Bond for fulfillment of contract with \_\_\_\_\_, dated \_\_\_\_\_, 190—, for \_\_\_\_\_.

[Form No. 27.]

[Department of public works of the island of Cuba. Contract bond.]

[When the contractor is an incorporated company and the bond is furnished by means of certified check.]

It is hereby made known that the undersigned, the company known as \_\_\_\_\_, an incorporated company, organized under the laws of \_\_\_\_\_, as the contractor, binds and obligates itself to the government of the island of Cuba in the sum of \_\_\_\_\_ (\$\_\_\_\_), in United States money, delivery of which it makes in the form of certified check No. \_\_\_\_\_ on \_\_\_\_\_ bank of the city of \_\_\_\_\_, payable to the secretary of public works in the nature of a forfeiture, hereby firmly binding itself, and obligating its successors collectively, to the punctual and exact payment of said sum.

By virtue of the nature of this obligation which the above-mentioned \_\_\_\_\_, as contractor, has entered into on the \_\_\_\_\_ day of \_\_\_\_\_, 190—, with the government of the island of Cuba, represented by \_\_\_\_\_ for \_\_\_\_\_, it is hereby agreed that the aforesaid obligation shall become null and void and the said certified check returned to the contractor if said \_\_\_\_\_ should duly and fully observe and execute in all senses all agreements, stipulations, and conditions agreed upon and entered into in this instrument by said \_\_\_\_\_, fulfilling them in accordance with the true spirit and purpose of said contract, to the same effect during any extension of time that in said contract the government of the island of Cuba might grant as during the original period agreed upon in the same, and in addition to the prompt and exact payments of all moneys due to persons for the furnishing labor or material in the course of the stipulated works in the said contract; otherwise the said obligation shall be maintained in its full force and vigor.

By virtue whereof this instrument is executed on the \_\_\_\_\_ day of \_\_\_\_\_, 190—, its (1) \_\_\_\_\_ placing thereon the name and official seal of the contracting party and duly attaching his signature hereto in accordance with the action taken by its (2) \_\_\_\_\_, approved on the \_\_\_\_\_ day of \_\_\_\_\_, 190—, a copy of which is attached hereto.

Attest:

\_\_\_\_\_ (3).  
 \_\_\_\_\_ for \_\_\_\_\_

(Issued in duplicate.)

[1] The president or officer authorized to sign for the corporation.

[2] The board of directors or any other administrative body of the corporation.

[3] Affix seal here.

[Indorsement.]

[Form No. 27.]

Bond for fulfillment of contract with \_\_\_\_\_, dated \_\_\_\_\_, 190—, for \_\_\_\_\_.

[Form No. 28.]

## ADVERTISEMENT.

[Proposal for ——— department of public works, chief office of the district of ———, 190—.]

Sealed proposals will be received at this office, ——— street, No. ———, until ——— p. m. on the ——— day of ———, 190—. ———.

The proposals will be publicly opened and read on the date and hour mentioned.  
Specifications, blank forms, and all necessary information will be furnished at this office.

## SPECIFICATIONS.

## GENERAL INSTRUCTIONS FOR BIDDERS.

ARTICLE 1. At equal cost and quality, the articles or materials of home production shall be preferred. Custom-house duties must be included in the cost of foreign articles.

ART. 2. All the necessary plans will be shown at this office.

The bidders or their authorized agents should inspect the place in which the work is to be done, in order that they may judge the facilities and difficulties that may be encountered in the execution of the work, taking into consideration, among other things, the probable changes in the weather and all other eventualities.

ART. 3. No bids shall be considered unless accompanied by a guarantee made in the form and manner specified in the special and economic conditions.

ART. 4. Any company duly incorporated under the laws of the United States or of the island of Cuba, and legally authorized to furnish bonds, may be accepted as surety. No private firm shall be accepted as surety as such, nor a partner for the firm of which he is a member. The stockholders of a company or corporation of which they are not officeholders may be accepted as guarantors for said company or corporation. Should the guarantors be private parties they must be citizens of Cuba.

ART. 5. In cases where the contractor or guarantor are private individuals an attachable stamp will be placed on the signature of the surety bond. The incorporated companies shall stamp an official seal, whether contractors or guarantors. The signatures on the proposals, contracts, and bonds shall be written in full, and shall be testified to by at least one witness, and, if possible, by a different one for each bidder.

ART. 6. Any proposal offered by a person adding to the signature the word "president," "secretary," "agent," or any other title, without designating the name of the sender or principal, shall be considered as a personal proposal made by said individual for his own account. That of an incorporated company shall be signed with the official title of the company, being signed as well by the president, secretary, or any other person authorized to enter into a contract in his name, who shall produce the power of attorney that for the purpose may have been conferred. That of a private firm shall have the firm's name signed by one of the members, or by one holding the power of attorney, placing thereon the names of all the partners. Whoever may sign a proposal as representative of another, or others, shall produce legal proofs showing that he is authorized to act as such agent.

ART. 7. After each signature the residence and post-office address, including the province, of each bidder, shall be stated.

ART. 8. The prices shall be given in words and figures.

ART. 9. To each copy of proposal there will be firmly attached a copy of the advertisement, which shall be considered as part of said contract, another copy containing instructions for the bidders, and another containing the specifications, all of which may be obtained at this office, personally or by mail.

ART. 10. No bidder shall be furnished with the names, directly or indirectly, of the persons who intend to make proposals, or of those who have been informed regarding said proposals.

ART. 11. The proposals shall be prepared without the aid of any person employed by the department of public works of the island of Cuba, or attached to this office.

ART. 12. All the blank spaces in the proposals must be filled without changing the wording of the proposals, nor adding anything to the particulars contained therein. Any condition, modification, or stipulation that may be added to the proposals shall be considered void, and therefore rejected.

ART. 13. The amendments by erasures or between lines shall be noted within the proposal under the signature of the bidder.

ART. 14. Any bidder who desires to withdraw his proposal may do so before the date fixed for the opening of the same without detriment to himself, stating his wishes in writing to the official in charge of the proposals, who will return same to the bidder or his duly authorized representative without reading it.

ART. 15. Whenever there is well-founded reason to suspect that one of the bidders is presenting more than one proposal relating to the same matter, all such shall be rejected.

ART. 16. No proposals shall be admitted after the hour set for the opening of the same.

ART. 17. The government of the island of Cuba reserves the right to reject each and every one of the proposals and to ignore any informality that may appear in the proposals presented, as well as to reject the proposal made by a bidder or contractor who the department knows is insolvent.

ART. 18. The general conditions of the contract which the bidder and bondsmen bind themselves to enter into shall be adjusted to the forms adopted and used by the department of public works, which may be seen at this office, and shall be furnished to those intending to present proposals, if they so desire it.

It is understood that those making proposals accept the conditions contained in said forms of contracts and sureties.

ART. 19. If the bondsmen are private parties they shall make and sign a sworn statement to the effect that they are in condition to fulfill the contract, said statement being indorsed on the bond for the fulfillment of the contract, and each one of the bondsmen shall furnish bonds for a sum equal to the amount stipulated in the special and economic conditions.

ART. 20. Residents of Cuba, property owners without incumbrance, shall be accepted as bondsmen the same as surety companies duly legalized. A certified check drawn for the stipulated sum on any bank of the island and payable to the secretary of public works, shall also be accepted as surety.

ART. 21. The bidders are invited to be present at the opening of the bids.

## GENERAL CONDITIONS—GENERAL ORDERS.

ART. 1. Cubans and foreigners who are in possession of their civil rights, in accordance with the laws of their respective nationality, and the firms and companies legally constituted or recognized in the island of Cuba, may be contractors of public works.

ART. 2. A copy of this advertisement, the general instructions and specifications, as well as the special, technical, and economic conditions, shall be attached to the contract, forming a part of the same.



ART. 3. Within ten days following the awarding of the contract the contractor shall furnish to this office his post-office address to where communications are to be addressed.

ART. 4. The transfer of the contract or of the share that may be had in the same, is prohibited by law.

ART. 5. The contractor shall not be permitted to take advantage of any error or omission that may have occurred in these stipulations, as at any time that they may be noticed, the necessary instructions will be given.

ART. 6. The decision of the chief engineer of the district, referring to quality and quantity, is final.

ART. 7. It is stipulated and agreed that the amount of work or materials which have been estimated and specified in the technical conditions are only approximate, and it should be understood that in no case, either by excess or defect, absolute or relative to the same, shall there be any claims made against the government of the island of Cuba.

It is understood that the bidders shall examine the plans, and they are urged to make a calculation of the amounts. It is reckoned beforehand that they will not differ ten per cent (10 per cent) from the amounts of works or materials done or required of those herein estimated.

ART. 8. If the time for the conclusion of the works is delayed, all the expenses of inspection and direction incurred during the time of extension (which shall be fixed by the chief engineer of the district) shall be deducted from the payments due or that may become due in favor of the contractor. It is nevertheless agreed that if, owing to local or general quarantine restrictions, inundations or any other unavoidable circumstances, or violence of the elements, the government should deem proper to grant the contractor an extension of time in writing in the manner designated in this contract, the expenses of inspection and direction incurred during said extension shall not be deducted; it being understood, besides, that nothing contained in these specifications shall affect the rights of the government to annul the contract as ordered in the form of contract adopted and used by the department of public works.

ART. 9. The contractor shall bind himself to protect the government of Cuba from any claim that may occur through having made use—in connection with the contract herein projected—of any process or mechanism protected by a patent.

ART. 10. It is expressly understood that the time stipulated is an essential condition of the contract herein mentioned, and that if it is not finished within the time stipulated, the contractor shall pay to the government of the island of Cuba the sum stipulated in the special and economic conditions for each day that, with the exception of Sundays and holidays, the fulfillment of the contract is delayed, said payment being made, not as a fine, but as an indemnity for damages; the government deducting the amounts owed for damages, in conformity with the conditions herein stipulated, from any of the amounts due, or that may become due, to the contractor.

ART. 11. In case of ambiguity in the phraseology of any of the articles of these specifications, or doubts in regard to the interpretation of the same, it shall be submitted to the engineer in charge, whose decision shall be final.

ART. 12. Any kind of works or materials that may have been accidentally omitted in the description of these works, but that are shown in the plans or general construction that must of necessity form part of the same, shall be made and furnished by the contractor, as if it had been specifically expressed.

ART. 13. The engineer in charge, repeatedly mentioned in these specifications, is the chief engineer of the corresponding district, or another engineer assigned by him for the direction and inspection of the works. The contractor shall receive in writing from the chief engineer all the necessary orders and explanations for the proper execution of all the works, object of this contract.

ART. 14. Wherever the word "contractor" is used, it refers to the person or company appearing in the contract, its duly authorized agents, or legal representatives.

ART. 15. The contractors are obligated to abide by the decision of the courts of the island of Cuba in all questions with the administration that may arise from their contracts.

ART. 16. These specifications shall govern in all that is not modified by the particulars of each contract.

#### EXECUTION OF THE WORKS.

ART. 17. The contractor shall begin the works within the time specified in the special conditions of this contract; they shall be sufficiently developed in order that, in the partial periods stipulated in the same, the corresponding portion be accomplished, and they be completed in the time stipulated. In the execution of the work they shall abide by the plans and outlines of the project officially authorized and to the provisions of the technical conditions and the orders and instructions issued by the engineers or immediate deputies in charge of the inspection. The contractor may at any time exact that those instructions and orders be given in writing; a requisite which shall be indispensable when an attempt is made to explain, interpret, or modify precepts of the technical conditions or of the plans. The contractor shall at any time have the right to appeal against the resolutions taken by the deputies to the engineer, and of those adopted by the latter, to the chief engineer, who shall decide in accordance with their authority whatever may be just and proper.

ART. 18. If by an unavoidable cause the contractor should be unable to begin the works in the specified time or should be compelled to suspend same, a reasonable extension of time shall be granted to him for the fulfillment of the contract.

ART. 19. From the moment the works are begun until they are delivered the contractor or an authorized representative shall reside a short distance from the works, and he shall not absent himself without the knowledge of the engineer, and shall leave some one to substitute him, to issue orders, make payments, continue the works, and to receive orders. Whenever this clause is not complied with, all the notifications made to him through the office of the mayor of his official residence shall be valid.

ART. 20. The contractor personally, or those in charge, shall accompany the engineer in all the visits of inspection that may be made whenever they are requested to do so. They shall likewise see that the proprietors and farmers of the contiguous land do not invade with their work the zone limited for the execution of the work, nor deposit in same materials of any kind, informing the engineer immediately of any infraction of this rule that he may notice.

ART. 21. The government may appoint on its own account one or more inspectors, who shall reside at a short distance from the works, whose duties shall be to see that the conditions of this contract are complied with. It shall be the duty of the contractor to permit them free access to all parts of the works and furnish them all the data relating to the personnel and materials used in said works.

ART. 22. The contractor shall not object to the engineers, assistants, or foremen in charge of the inspection of the works, nor demand that the administration assign other engineers for the examinations and measurements. Whenever he considers himself injured by the same he shall proceed as indicated in article 17, appealing in reasonable and well-founded complaint to the chief engineer, who shall either decide or inform the government, but this shall in no manner interfere with the work.

ART. 23. The number of workmen and the necessary means for the execution of the works shall always be in proportion to the nature and extension of the work to be accomplished; and in order

that the engineer may assure himself of compliance with this condition, the contractor shall furnish a list of the same whenever it may be claimed.

ART. 24. For disrespect or disobedience to the engineers or assistants in charge of the inspection of the works, or for causing disturbances that may stop the works, the contractor shall be obliged to discharge his clerks and workmen whenever the engineer so requests him, without detriment to appeal to the chief engineer if he deems that there is no well-founded ground for that order.

ART. 25. It shall be for account of the contractor to indemnify the proprietors for all the damages that the execution of the works may occasion, either through the work in the quarries, the diggings for the roadbeds, by the mounds of dirt, and by the use of the land for erecting workshops and storing materials; with the preparation of the roads for the transportation of the aforementioned materials and with any other operation required for the execution of the work.

ART. 26. The contractors may use and extract the materials that may be found in lands of the State free of cost, but must subject themselves to the police rules given to them by those in charge of the administration and care of said lands, to whom due notice shall be given in advance, respecting and reserving the existing rights, adopting the necessary measures for the proper use of the lands.

ART. 27. The contractor is at liberty to take the material from those places he may deem convenient, if they combine the conditions required in the contract, are perfectly prepared for the purpose to which they are to be applied, and properly used in the works.

ART. 28. No material shall be used until it has been examined and accepted in the manner prescribed by the engineer.

ART. 29. Until the final acceptance takes place, the contractor is exclusively responsible for the execution of the works he has contracted for, and of the faults that in the same may be noticed; that the engineer and his subalterns had examined and inspected same during the execution of the works shall not be taken as an excuse nor shall such claims be recognized. Therefore whenever the engineers may notice any defects in the construction, either during the same, or after it has been finished and before its acceptance, they may order the defective parts torn down and rebuilt at the expense of and by the contractor.

ART. 30. If the engineer has well founded reasons to believe in the existence of hidden defects in the construction of the work accomplished, he shall order at any time, before the final acceptance, the demolition of those that may be necessary to examine those supposed to be defective. The expenses incurred by the demolition and for the rebuilding shall be for account of the contractor, if the defects really exist, otherwise it shall be for account of the administration.

ART. 31. The scaffolding and all other necessary apparatus for the construction shall be for account and risk of the contractor: any suggestion made by the engineer for the safety of the workmen shall be taken into consideration.

ART. 32. No inscription shall be permitted on the works without the authorization of the government.

ART. 33. The government reserves the right of ownership of any antiquity, objects of art, and minerals suitable for public instruction that may be found in excavations and demolitions. The contractor is obliged to use all the precautions indicated by the engineer in their extraction, excepting the right of indemnity for the expenses that this work may occasion.

#### ECONOMIC CONDITIONS.

ART. 34. The contractor shall be paid for the work actually done, in accordance with the approved project or modifications introduced or orders he may have received in writing, if they be in accordance with the provisions contained in the technical conditions in accordance with which the measurements and graduation of the different unities shall be made. Therefore, the number of each kind of the works consigned in the technical conditions shall not serve as basis to prevent a claim of any kind.

ART. 35. Whenever the contractor voluntarily uses any material duly authorized by the engineer, of larger dimensions than those stipulated in the special conditions, he shall only be entitled to receive pay for the work that may result from the measurement made in accordance with the project, and with the prices of the contract. If it be of less dimensions and notwithstanding this it should be accepted, the payment will be made in accordance with the results of the measurement.

The excess of material used due to increase of the measurement shall also be paid, if the contractor has received written order to that effect from the engineer.

ART. 36. The payments shall be made at the periods stipulated in the special conditions of the contract by means of drafts issued by virtue of work certificates given by the engineer. Its amount shall be delivered personally to the contractor in whose favor the works have been awarded or to the person legally authorized by him, and in no case to any other, though orders may be issued to that effect by any authority or court for its retention, inasmuch as it refers to public funds which are to be used for the payment of workmen and not for obligations of private nature of the contractor. Only on the balance that may remain after the final acceptance of the work in accordance with the specification and with the bond, if it should not have been necessary to retain the same for the due compliance of the contract, may the embargo be placed as ordered by the aforesaid authorities or courts.

ART. 37. The certificate of works shall be issued in the time specified in the economic conditions of the contract, with the character of provisional receipts, subject to the changes and rectifications that may appear from the final liquidation.

ART. 38. The contractor shall not be entitled to claim indemnity for losses, damages, or injuries caused in the work excepting in cases of unavoidable circumstances, the following being the only cases considered as such: First, fire caused by lightning; second, damages caused by earthquakes; third, the destruction violently caused by armed forces during war times, general uprisings, and robberies.

#### MODIFICATIONS OF THE PLAN.

ART. 39. If before the commencement of the works or while they are being carried out the administration should decide to make any changes in the said plan that may increase, reduce, and even suppress the amount of work estimated, or substitute one building for another, if they be of those comprised in the contract, the contractor shall be compelled to follow these instructions, not being entitled to claim indemnity for suppression or reduction of works, adducing the profit that he could have obtained in the work reduced or suppressed.

ART. 40. If the administration should deem necessary to suspend the whole or part of the contracted work, in order to carry out the modifications referred to in the preceding article, the contractor shall be furnished with a written order, measuring the work accomplished up to where the same has been suspended, and the fact duly recorded.

#### RESCINDMENT OF CONTRACTS.

ART. 41. In case of death of the contractor the contract shall be rescinded unless the heirs should offer to carry it out under the same specified conditions. The government can admit or reject this offer, and in the latter case said heirs shall not be entitled to claim indemnity of any kind, though

they may compel the State to purchase by valuation the necessary tools and utensils used in the works and indispensable for the completion of same.

ART. 42. When the works can not be commenced for causes for which the contractor is not responsible, or when it be ordered by the government that said works already commenced be indefinitely suspended, the contractor shall be entitled to the annulment of the contract, in which case provisional acceptance of the work done shall take place and final acceptance when the period of the guarantee shall have expired.

ART. 43. Should the time stipulated for the completion of the work have transpired without raising the suspension to which article 40 refers, the contractor shall have the right of annulment and to proceed with the provisional of the work accomplished, and to the final when the period of the guarantee shall have expired.

Equal rights are granted if the suspension should last more than one year, if the amount of the work in reference should be greater than one-quarter of the total of the contract.

ART. 44. If the contract is annulled for reasons expressed in articles 42 and 43, the tools and utensils indispensable for the completion of the work and the use of which may have previously been authorized by the engineer, and which the contractor should not wish to keep, shall be taken by the government in conformity with mutual valuation or by expert, without increase of any kind under a pretext of profit or any other reason, it being understood that the payment of these shall only be made when the cost of the work done prior to the annulment shall reach two-thirds of the work contracted for harbor work and similar ones, and to four-fifths of road work and others of like nature.

The material gathered and placed near the work, if it be acceptable and to be used for the completion of the works, shall be also taken for account of the administration at prices agreed upon by mutual valuation.

ART. 45. The development of the works shall be stipulated in the special technical conditions of each contract specifying prudential periods for the progress of the works within the time allowed for the completion of same.

These periods shall be binding on the contractor, and should there be any reason to believe that he would not give the necessary development to the work within each of the periods the chief engineer shall previously report in writing to the contractor, prescribing at the same time any instructions that may lead to the prompt termination of the contract.

If in spite of this the end of any of the periods should be reached and the work should not have been completed by the contractor as required, the annulment of the contract shall follow.

#### ACCEPTANCE OF THE WORKS AND FINAL LIQUIDATION.

ART. 46. As soon as the work is completed the same shall be provisionally accepted by the engineer that the general administration may appoint, and in the presence of the contractor or of his duly authorized representative.

The result of the acceptance shall be recorded and signed by all those present and forwarded to the general administration. Should the work be found in conformity and in accordance with the conditions, it shall be considered as provisionally accepted, delivering it for public use, and the period of guarantee, stipulated in the special conditions in the hands of the contractor, shall commence.

ART. 47. After the works have been provisionally accepted the general and final measurement of same shall be undertaken with the assistance of the contractor or of a representative appointed by him.

The plans and outlines of the projects shall serve as a base for the measurements of gradings, in which plans shall be drawn, together with the measurement taken at the work, the form and condition in which the surface of the land has remained, in order to calculate the number of cubic meters of earth removed and graded which the contractor has accomplished.

The building work shall have outside measurement, and inside, the dimensions consigned in the plans and outlines, which have been made during the construction and which shall be signed by the contractor and engineer, shall be adopted.

ART. 48. The valuation of the work accomplished by the contractor shall be made by applying to the general and cubic measurements the prices that for each unity of work the contract stipulates, and bearing in mind, besides, the provisions of articles 34 and 35 of these specifications.

ART. 49. During the period of guarantee the preservation and care of the work shall be in charge of the contractor, who shall use in the same the materials in accordance with the instructions given by the engineer. Should he neglect the preservation, and the public transit and use of the work should be endangered through disobedience of said orders, the administration shall undertake the necessary work, for account of the contractor, to avoid the danger.

ART. 50. At the completion of the guarantee period the final acceptance shall be proceeded with in accordance with the formalities stipulated in article 46 for the provisional one, and should the work be found in a perfect state of preservation it shall be considered as accepted and the contractor is thereby relieved of all responsibility.

Should the work not be found in good condition it shall be so recorded; the engineer shall give precise and detailed instructions to the contractor to remedy the defects noticed, and a certain time shall be given him for that purpose, at the expiration of which a new examination and acceptance of the work shall take place. Should the contractor fail in this respect the contract shall be annulled.

ART. 51. Should the government deem it convenient to accept partial work, the contractor, though relieved of the responsibility of the work accepted, shall not have the right to the proportionate amount of the surety, which shall remain intact until the completion of the works, to guarantee the fulfillment of the contract.

NOTE.—This form shall be used in all kinds of contracts by only filling the blank spaces of the advertisement.

[Form No. 29.]

[Department of public works of the island of Cuba.]

#### SPECIFICATIONS.

The articles shall be filled in as may be necessary, with the special conditions of the work that may be under consideration, under the following headings:

- (1) Quantities of work estimated for.  
(These shall be given in accordance with the estimate, with statement of the quantity of work that the project consists of.)
- (2) The amount shall be stated in round numbers, without fraction or decimals.)
- (3) Description of the work.
- (4) Conditions that the materials must possess.
- (5) Of the execution of the work.
- (6) Special clauses.



[Indorsement.]

[Form No. 30.]

Department of public works, district of ———. Comparative recapitulation of bids received  
on ———, 190—. Work ———. (Signature) ———, (position) ———.

[Report and recommendations.]

District of ———, ———, 190—.

[Form No. 31.]

[Department of public works of the island of Cuba, district of ———. Work ———.  
Contract dated ———. Contractor ———. Certificate ———, No. —.]

Total amount of work done on ———, 190—.				Amount.	
Quantities.	Class of work.	Contract prices.		Dollars.	Cts.
Total amount .....					
Amount of ——— per cent retained according to contract until final settlement .....					
Amount of difference in favor of contractor .....					
Amount of all certificates of former payments .....					
Net amount due contractor .....					

I certify that the preceding statement is true and exact as to the work done up to day of appraisal, ———, 190—, and that there have been applied the prices and conditions contained in contract and amounts previously paid to contractor deducted, leaving balance of \$ ——— due. ———, 190—.

Examined and approved.

Chief Engineer.  
(Made in triplicate.)

Engineer in Charge.

[Indorsement.]

[Form No. 31.]

Department of public works of the island of Cuba, district of ———, work ———. Contractor ———. Certificate ———, No. ———, date ———, 190—. Net amount \$ ———.

[Form No. 32.]

[Department of public works, district of ———, work ———.]

Fortnightly report of machinery, supplies, and personnel employed by the contractor during  
fortnight from ——— to ———, 190—.

Date.		Machinery and supplies.					Personnel.				
Month.	Day.										

I certify that the foregoing statement is true.

(Place) ———. (Name) ———.  
(Date) ———. (Position) ———.

[Indorsement.]

[Form No. 32.]

Department of public works, district of ———, (place) ———, (date) ———.  
(Name) ———, (position) ———. Machinery, supplies, and personnel employed by  
the contractor ——— during the fortnight from ——— to ———, 190—. Work ———.

## APPENDIX E.

No. 356.

HEADQUARTERS DIVISION OF CUBA,  
*Habana, September 13, 1900.*

The military governor of Cuba, upon the recommendation of the secretary of public works, directs the publication of the following order:

I. All carts and wagons which have to use public roads and highways must be entered in a register established in the municipality to which they belong.

II. Alcaldes shall put said registers in charge of one of the municipal officials and the latter, after due examination of the vehicle, shall issue to the owner thereof a certificate stating: (a) The number of the registration; (b) the number of wheels; (c) the width of the tires; (d) whether or not it has springs; (e) the tare, or weight of the empty cart, and the gross weight allowed to be drawn including weight of vehicle, according to the tables which accompany this order and complying therewith in every respect. Fifty cents, United States currency, shall be collected for the registration of each cart or wagon.

III. Whenever the copy of a certificate of registration is requested, the original certificate or the cart in question, or both, must be shown, according to circumstances. Said copy shall be marked "copy," and shall be delivered upon payment of 50 cents, United States currency.

IV. Each vehicle shall bear visibly on its forward right side a brass plate upon which shall be stamped in a permanent manner the data contained in the preceding article, together with the name of the municipality where the registration was made.

V. Municipalities shall transmit every fifteen days to the director of public works the stub copy of the registration and the amount collected for same. Whenever necessary, the director of public works shall have the complete list of the registrations and all details of each registration printed, and shall furnish said lists to the officials employed in the preservation of public roads, who are charged with the enforcement of these provisions.

VI. The maximum load which may be carried by a vehicle shall be established by the keeper of the book of registry, with due consideration for conditions and in strict accordance with accompanying tables.

VII. The rural and urban police, the public works overseers, foremen, and workmen charged with the preservation of public roads and highways, shall see to the enforcement of the provisions of this order and exact strict compliance therewith, but none but the overseers shall be authorized to impose and collect fines, and all infringement of this law shall be reported to them.

VIII. Whenever a vehicle is found with a greater load than corresponds to it, according to the hereinbefore-mentioned tables, the driver thereof, at his own risk and expense, shall be made to unload the excess at the nearest public works road house, police or rural guard station, and the owner of the cart shall be fined \$5, United States currency. The articles unloaded shall remain in the aforesaid place up to six days and shall be delivered to the owner of the vehicle only upon presentation of the receipt for the fine and the other expenses incidental to the unloading.

IX. The fines shall be collected by the overseers, and every fifteen days the latter shall forward to the chief engineer of the district the corresponding stub vouchers and amount collected. The district chiefs will deposit and use said amounts as provided for in paragraph 59 of the regulations of the department of public works, dated May 28, 1900. For said fines the overseers shall be provided with a paged stub book, with triplicate stubs, one to remain in the book, one to be sent to the chief engineer of the district, and the third shall be given as a receipt to the interested party. All shall be signed by the overseer. If at the close of the six days' deposit the articles or goods should not have been claimed, they shall be sold at public auction and the amount received therefor shall remain for ten days at the disposition of the owner, and if not claimed by the end of said period it shall be sent to the chief engineer of the district. If the articles should not be sold, they shall be sent to the chief engineer of the district, who shall dispose of them as of state property.

X. Whenever the articles or goods are perishable they must be auctioned twenty-four hours after being seized. If their condition will not admit of the twenty-four hours' delay, they may be sold immediately upon the appraisment of the overseer.

XI. In the first case, the auction sale shall be announced three full days before the close of the six days mentioned in Article VIII, by means of notices posted on the house where the goods are deposited and in the stores of the nearest town. In

the above-mentioned urgent cases it will suffice to post the notice for a few hours. In all cases, whenever possible, the driver of the cart from which the articles were unloaded shall be notified. The result of the sale, minus the expenses of the same, shall be sent to the chief engineer of the district.

XII. The provisions of this order shall go into effect November 1, 1900.

XIII. The registrations shall be made as soon as the driver presents himself with his vehicle to have it registered, provided he appears between 8 a. m. and 5 p. m.

XIV. The respective alcaldes shall dispose of 25 per cent of the registration fees as compensation for any expenses incurred.

XV. Any complaints against the officials in charge of the registers shall be directed to the provincial or district engineer of the department of public works to which the municipal district corresponds.

XVI. Registrations made in one municipal district are good in any other the vehicle may work in.

XVII. The provisions of this order apply likewise to guaguas (omnibuses) and automobiles, whether used for passengers or merchandise.

XVIII. The weight of passengers shall be calculated upon a basis of 140 pounds per person.

XIX. Rubber tires shall be measured at their extreme width.

XX. Vehicles with rubber tires may carry one-third more than the schedule load corresponding to them.

XXI. Iron tires must be flat, the maximum wear allowed in the exterior edges being 0m.005 radius. Vehicles with tires showing a greater wear than 0m.005 in their exterior edges shall not be registered.

XXII. Every infringement of the provisions of this order shall be subject to a fine of \$5 United States currency.

XXIII. Any change or alteration of the brass plate of a cart or wagon shall be punished with a fine of \$25 United States currency.

XXIV. In order to establish the existence of the overweight referred to in this order, and for the purpose, also, of improving the service, scales for weighing carts and wagons shall be established in all the public-works sheds where the overweight is deposited.

J. B. HICKEY,  
*Assistant Adjutant-General.*

## APPENDIX F.

### INTERNAL REGULATIONS OF THE SERVICE.

#### CHAPTER I.

##### GENERAL OBLIGATIONS.

ART. 1. All the personnel of the department shall be in every district subject to the orders of the chief engineer of the same.

All technical functionaries or employees who in performance of duties of the service shall arrive at the place of residence of the chief of the district must personally present themselves to him to receive orders should there be any.

ART. 2. The temporary professional personnel engaged in surveys or works shall be responsible to the engineer in charge for the part of the work intrusted to them, but they will, however, render due obedience to the chief of the district, who shall issue his orders through the engineer in charge.

ART. 3. The professional personnel shall be responsible for the work intrusted to them, and shall exercise due watchfulness over the employees under their immediate orders.

ART. 4. Work in the country must be for eight complete hours daily at least, and always finishing any detail that it would not be proper to leave until the following day, even if work is extended beyond the said eight hours.

ART. 5. When the personnel that are not regularly appointed employees, such as foremen, masons, carpenters, laborers, etc., should work overtime, they shall be credited for said work by hours in the following manner:

The hours between the ending of the daily work and 8 o'clock at night, at the same rate agreed upon for day's wages.

The hours from 8 until 12 o'clock at night, at the rate of one-half more than the day's

wages agreed upon, and the hours from 12 to 6 o'clock the following morning, at the rate of double day's wages.

ART. 6. The work should be arranged in a manner that the specified eight hours may be taken up. If an individual by reason of sickness or any accident could not continue to work, report of the fact shall be immediately made to the chief in charge, who will decide as to his temporary or definite substitution according to the conditions of the case.

#### INSTRUMENTS AND TOOLS.

ART. 7. All instruments or tools employed in any work must be returned in the same condition in which they were received, with the exception of the natural wear from use. The receiving and delivery of instruments or tools for any work must be made by inventory in which is stated their condition at both times.

This inventory must be signed by the engineer of the district and the chief in charge of this work or his duly authorized delegates.

ART. 8. For any damage caused to an instrument or tool the employee using it at the time of the injury shall be held responsible, and must pay for its value or for its repair, as the case may be, if the injury could have been avoided, in the judgment of the engineer of the work, to whom report shall be made of the said injury.

The chief in charge of the work, in turn, if the importance of the instrument or tool so requires, will report the injury to the chief from whom he received the instrument or tool, saying whether it can be repaired or substituted at the work and naming the employee that should pay for it, if in his opinion he should do so.

#### TRANSPORTATION AND SUBSISTENCE.

ART. 9. The following have the right of free transportation:

1. The functionary or employee who resides at the time of his appointment away from the place to which he is sent, to go to the said place and return to his home after he has performed the service that has been intrusted to him. He loses the right of free transportation home if he has been dishonorably discharged from his position.

2. Every functionary or employee to leave the place of the work, if he can not reside thereat, for a place chosen for his residence if the latter is more than 2 kilometers distant.

3. The functionary or employee who, by a duly authorized person, may be called away from the work to any place distant therefrom 2 kilometers, for his going and returning to the work. Also any functionary who by superior orders assumes charge of any sale, inspection, etc.

ART. 10. The personnel in charge of and employed in the commissions for studies shall be entitled to subsistence during the time that they may be rendering service away from the home station.

ART. 11. The personnel in charge, and such as may be appointed, of works at which, due to their distant position from any town or any possible place of residence, who shall have to live in tents or isolated places, shall also be entitled to subsistence. In such cases the circumstance must be made known by the chief engineer of the district on pointing out the plan of work, or when the progress of the work renders it necessary.

ART. 12. The department will provide tents and the necessary utensils and will authorize the employment of a cook, the assistant engineer in charge of the work to be responsible for the organization of the subsistence service.

### CHAPTER II.

#### METHOD FOR UNDERTAKING AND CARRYING OUT OF THE WORKS.

##### *Preliminary data.*

ART. 13. After the works to be preferred shall have been determined upon in each district, by the superior authorities, the chief engineer shall be informed thereof, and instructions given him to make by himself alone, if possible, a preliminary examination on the grounds and to prepare a report.

ART. 14. This preliminary report will be limited to stating the convenience and necessity of the work, its importance, benefits to be derived, and the most proper means of carrying it out. He shall attach a list of the personnel which in his judg-



ment will be necessary for the preliminary study and an approximate estimate of its cost and preparation of the preliminary project.

ART. 15. To meet the expenses caused by these preliminary reports funds shall be sent to the chiefs, or they shall be notified to enter them against any certain credit that they may already have.

#### PRELIMINARY STUDY AND PROJECT.

ART. 16. The convenience of a work having been agreed upon, the preliminary study and preparation and preparatory project shall be ordered. To meet the expenses incurred thereby the necessary funds will be sent, or instructions given to charge them against some special credit granted for the purpose which the chiefs of districts have already at their disposal.

ART. 17. The purpose of the said studies is to approximately ascertain the direction and extent of the project, the different unities of works that may have to be carried out, their cost, and the total estimate of funds required for finishing them.

ART. 18. This preparatory project after being examined and approved may serve as a base for the securing of the appropriation that may be necessary, consequently the estimate must comprise all the necessary administration and inspection expenses for the execution of the work.

#### FINAL STUDIES AND PROJECTS.

ART. 19. After the aforesaid credit shall have been granted the fact will be made known to the proper chief engineer of the district, and he will be given instructions to prepare the final project in which the work to be done must be specified, by means of detailed plans, estimates, and a sensible report as to the manner in which he recommends that the work be done, and if by contract or directly by the department.

ART. 20. In all works of importance, and for the purpose of saving time, these projects may be prepared in parts, sections, or piece. For this purpose special instructions will be given in each case.

ART. 21. The project shall be forwarded to the director-general, who, being in conformity therewith, or making the changes therein that he may deem proper, shall submit it to the secretary for final approval.

#### EXECUTION OF WORKS.

ART. 22. After the approved project shall have been returned to the chief engineer of the district, the latter must include in his next requisition for monthly funds the amount that he may deem necessary for the following month.

ART. 23. If it shall have been decided by the department that the works are to be done by contract there shall be prepared without delay and forwarded to the director-general the form of advertisement, general conditions, and form of proposals, which, after being approved and returned, shall be printed in accordance with article 191 of the regulations for the government of the department.

ART. 24. After the award of the contract shall have been made and the latter signed and approved by the department, the work shall be undertaken by the contractor, the department appointing an inspector, who, upon the ground, will exercise watchfulness over and exact the fulfillment of the conditions of the contract.

ART. 25. If the work is to be done directly by the department, authority will be asked for the employment of the necessary personnel and purchase of material, in conformity with the regulations.

The work shall be carried out in accordance with the approved project; no modifications may be made in relation to the same without having first been submitted for approval to the department.

ART. 26. At such periods as the director-general and secretary may specify, visits of inspection shall be made to works under study or execution by persons that may be designated for the purpose, no matter in what form the work may be carried out.

#### CHAPTER III.

##### FIELD WORK—GENERAL RULES.

ART. 27. The field books to be used shall be precisely of the best kind and those to be had in the market, with special ruling for the different kinds of work.

ART. 28. On the first page of each book must be written the name of the provincial district, title and class of study and of notes, names of the engineer in charge and

personnel attached to the work, and stations that the book embraces. An index of all its contents must be made, and care taken to mark "not used" every line in the said condition.

ART. 29. The field books shall contain a clear statement of the work done each day, and dates attached.

ART. 30. The annotation of field work shall be made in accordance with the official blank forms, and must be complete and clear in order to prevent misinterpretation, and intelligible to everybody.

ART. 31. At the termination of each day's work the arithmetical deductions shall be made and afterwards copied in ink in similar books by the same person who originally made them, including the observations made during the day.

ART. 32. During the progress of the study, and taking advantage of days lost by rain or other reason, a blotter of the survey and profile or other plans necessary shall be made.

ART. 33. At the conclusion of a preliminary or final study, the books written in ink shall be forwarded to the chief engineer of the district. The original books in pencil will remain in the possession of the engineer in charge until the conclusion of the work, to be then delivered to the chief engineer. The latter will forward to the office of the director-general the books written in ink that they may be placed in the archives.

ART. 34. Every field book in which annotations or observations of any kind relating to the service of the department, be they original or copies, shall be considered as the property of the department.

ART. 35. The assistant or engineer that uses an instrument shall see and be responsible that his instrument is always properly adjusted and in the proper condition for work.

ART. 36. The chief engineer should inform himself that the person to whom the use of an instrument is intrusted is perfectly acquainted with its management and is able himself to attend to the different adjustments that every instrument requires.

#### PRELIMINARY REPORTS.

ART. 37. In general the preliminary report shall be limited by the going over of all the ground which is comprised in the work in question that may be deemed indispensable, either on horseback or by boat, and accompanied by a guide, assistant, or other employee.

ART. 38. The instruments to be employed shall be always of the kind most easily carried, such as tape line, hand level, prismatic needle, sextant, or aneroid barometer, etc.

ART. 39. There shall be noted in the field books all data or observations that may have connection with or influence the determination of, first, the advantages or benefits accruing through the work to the general public interests as well as to the local interests; second, the extent of the work and the probable cost of the preliminary studies, and third, if possible, an approximate idea of the cost of the works.

#### PRELIMINARY STUDIES.

ART. 40. Before commencing the study the chief engineer will furnish the engineer or assistant in charge with such special instructions as he may deem that the case requires, among which he must give the general plan, extent, and limit of the lines or areas that have to be gone over.

If it is possible the chief engineer and the engineer in charge of the study shall first make an examination of the entire course to be able to give on the ground the proper interpretation of the instructions.

ART. 41. In certain cases surveys will be allowed to be made with instruments of limited precision, such as the compass, hand level, etc., but it shall be necessary to obtain prior authorization for the purpose.

ART. 42. In general the preliminary studies, according as the case may require, shall be made in conformity with the method determined by articles 43 to 51, or according to the method indicated in articles 52 to 61.

ART. 43. In preliminary studies requiring greater exactness the route shall be laid down by means of a line run with a transit, driving stakes having tacks of copper or galvanized iron at the places occupied by the instrument and placing stakes every 20 meters, measured with the chain.

ART. 44. As far as possible stakes shall be prevented from being above the surface of the ground, on sidewalks, paths, or in any other place of transit. Stakes should be driven at least to a depth of 15 centimeters or the greater necessary depth to make them secure.

ART. 45. The numeration of the stakes shall be running from 0 to 1,000 where a section of 20 kilometers ends, and the following section must again commence with stake 0.

ART. 46. There shall be observed and noted, as indicated in the form, at each point where the transit is placed, the magnetic variation of the needle, which will serve for comparison with the corrected reading that is kept. The difference between the two must not be over 15 minutes, except in cases where there is local attraction, which will disappear on taking up the following stations.

ART. 47. In the levelings there shall be established at the point of departure and at each kilometer a reference point, the same to be solid and permanent, the description and position of which shall be noted in the field books.

ART. 48. Whenever it is possible there shall be taken as a basis of comparison the level of mean tide, and if any other imaginary base is used the notes should be corrected at the first opportunity in order that they may have reference to the basis of mean tide.

ART. 49. The height of the land close to each stake and in the changes of grade between stakes shall be taken; the same at all road crossings or railroad crossings.

ART. 50. The sights shall be read to the nearest decimeter in land observations, and to the centimeter as regards points of reference or for changes of position of the instrument.

ART. 51. All lines of level shall be proven by going over again the points of reference. The work shall be organized in a manner that the said rectifications may be made progressively as the work advances without leaving behind long sections of leveling without rectification.

The rectifications as to points of reference will be accepted if the difference is within the formula herein given, otherwise the leveling must be repeated.

D equals 5 cms. K in which

D equals difference.

K equals distance in kms. between points of reference.

ART. 52. In the majority of preliminary studies of roads it will be sufficiently exact that the error be reduced to 1 per cent with the transit by the static method, making the annotations in accordance with the official form.

ART. 53. At every point at which the transit is placed there shall be driven a stake to the level of the ground, and another of reference to the left side and at one-half meter distance therefrom upon which the station number shall be placed.

ART. 54. After the transit shall have been placed and leveled at any station whatsoever, the height of the instrument shall be taken with a pocket tape measure or by eye, the height of the instrument being the distance in meters and centimeters from the stake to the telescope, which distance shall be noted in the field book and shall serve for the purpose that in all observations taken afterwards at the said station to obtain the "vertical angle" that the line of sight be parallel to the line between the stake of the station and the point of land upon which the sight is fixed.

ART. 55. Every time that a sight is taken entry shall be made in the first four columns of the field book; first, description of the point at which the sight is taken; second, with the vertical hair cutting the sight in two, the magnetic variation shown by the needle of the instrument will be noted; third, causing the lower hair of the web to coincide with any determined unity of a meter or decimeter, the distance shown in centimeters by the upper hair of the web will give the distance in meters, to which is to be added the constant error of the instrument; fourth, bringing the horizontal central hair of the web to the corresponding height of the "height of the instrument," observing beforehand that the bubbles in the two small levels of the instrument are in the center, the "vertical angle" may be read, which will be noted by a positive sign if the inclination is ascending and by a negative one if descending.

Columns fifth and sixth will be filled in, in camp or at the office, either by means of trigonometry calculations or by means of the diagrams or tables that are used for the purpose.

ART. 56. The first sight taken at each station shall have reference to the preceding stations, so that there shall always be proofs of direction, distance, and vertical angle between stations. The average of the two series of observations shall be accepted as final, except in cases of apparent errors of importance.

ART. 57. The distance between stations in general shall not be more than 250 meters.

ART. 58. An observation shall be taken at about every 50 meters and at all points of changes of grade for the purpose of giving the profile of the survey.

ART. 59. In the frequent cases in which a sight may be taken from one stake to another, but not at the bottom of any gulch or stream between the said stations, a provisional stake shall be driven and observations taken on one or both sides of the gulch or stream, and on going forward with the instrument to the next station the

engineer or assistant shall stop and make the profile of the crossing by means of tape-line and hand level, taking as the point of departure the aforesaid provisional stake.

ART. 60. When greater exactness is required or in lands subject to local attraction, instead of the magnetic variations of the second column there shall be entered corrected courses or azimuth angles of the meridian, after they have been obtained by observation of a circumpolar star, and the direction taken from one stake to another of the route by means of the horizontal graduated circle of the transit.

ART. 61. The personnel of a static survey party shall be composed of the auxiliary or assistant engineer in charge of the instrument, 1 note taker, 2 target carriers at least, 1 instrument carrier, 1 stakeman, and the axmen that the nature of the land requires.

ART. 62. The preliminary surveys of roads should follow and take advantage of, as far as technical demands will allow, the belt of public land.

ART. 63. The maximum grade for roads in general shall be 5 per cent, but a grade of 7 per cent will be allowed for a short distance, and following long level stretches a very heavy grade may be used.

ART. 64. The position of all fences, walls, ditches, etc., must be marked, showing the boundaries of the roads or adjoining properties, the same as every house within a distance of 30 meters of the axis of the line; and all street crossings shall be measured to a distance of 60 meters on each side of the axis of the road. Should it be possible the names of the owners of the properties along the road should be obtained and the dividing line between the same properties.

ART. 65. All culverts and drainage should be marked out and noted, their elevation above the road, their size and condition; the position and dimensions of every culvert that may be necessary should also be marked out.

ART. 66. The positions of all bridges should be stated, the length of their spans, class of work, dimensions, conditions of the piling and abutments, the height of the water at normal periods, and minimum and maximum heights of freshets, current, depth, position of the two banks for a distance of 30 meters on each side of the axis of the bridge.

ART. 67. Completed and detailed notes must be obtained concerning the following points:

Class of land and materials at each station, description of the rock and loose stone in the immediate vicinity of the road, situation of places near to the road where quarries may be found, soft limestone and sand, together with description and samples of the said materials.

There shall also be noted the proximate length of the sections where fences, macadam, Telford, drains, etc., have to be placed, and the points where water may be obtained for the steam roller and other uses.

ART. 68. The necessary studies shall be made and embodied in the report as to the nature and conditions of the localities in which the works may be established.

The plan for the foundation of the said works shall be made in view of the result obtained from soundings previously taken.

#### FINAL STUDIES.

ART. 69. The surveys shall be made only by means of transit and level in the form indicated for preliminary studies in articles 43 to 51, in addition to the requirements hereinafter stated.

ART. 70. The manner of making notes in the level books is not changed, but the annotations in the transit books shall be made in accordance with the official form for this kind of studies.

ART. 71. In road surveys the stakes that are placed at the points of tangents of curves and angle points must be driven level with the ground and their position be in reference to fixed points situated in places from where they need not be removed during the building of the road and marking the degrees and direction of the curve and the initials P. C. or P. T., as the case may be, on the stakes that mark the points of the curve or the tangent.

ART. 72. Every angle shall be corrected by repetition and every stake that marks the axis of the course shall be driven at the central point between two observations, one of them taken with a telescope in a reversed position for the purpose of correcting any error of adjustment in the instrument.

ART. 73. To mark the curves, first there shall be placed a permanent stake at the point of intersection of the two tangents. From the said point there shall be measured, in connection with both tangents, the distance to the points where the curve begins and ends, and a stake shall be placed at its beginning (P. C.) and another at its end, or that is, at the beginning of the new tangent (P. T.). Then with the instrument at P. C., or at intermediate stations of the curve, should it be necessary, the

latter shall be marked out by means of deflections and tape. The exactness of the work shall be corrected at stake P. T., previously driven.

ART. 74. The length of tapes to be used for marking out curves shall be 20 meters when the radius of the curve is greater than 300 meters; of 10 meters when it is from 75 to 300 meters, and of 5 meters for radii less than 75 meters.

ART. 75. In this class of surveys only the steel tape measures shall be used.

ART. 76. The transverse sections shall be taken at each stake of the line situated 20 meters apart, and besides at every other intermediate point between the stakes that may be necessary from the change of grade or any other reason.

ART. 77. The points of reference for leveling shall be permanently placed at points on each side of the axis of the line, at a distance outside of the belt taken up by the building of the work.

The said points of reference shall be separate from each other about 500 meters and shall be marked in regular rotation; their description and position shall be noted in the field books.

ART. 78. The sights shall be read in centimeters as regards the land and even in millimeters as regards points of reference and points of change of instruments.

ART. 79. All series of levelings must be corrected by being again gone over. The allowable difference in this kind of surveys shall be  $D$  equals  $2$  cms.  $K$ .

#### CHAPTER IV.

##### PREPARATION OF PLANS—GENERAL RULES.

ART. 80. The preliminary reports and documents of all kinds that constitute a project, preliminary or final, shall be of the official size of 20 by 35 centimeters, written, if possible, on typewriter on only one side of the sheet.

ART. 81. The paper to be used shall be of the best kind, of linen, fair thickness, and without ruling. The wrapper to inclose the document shall be a single sheet of the proper size and of paper of special hardness. It shall be joined by two fasteners to the top edge of the document.

ART. 82. The title page on the cover shall be written by hand, and shall state the district, province, report, or project; in the latter case the nature of the document, the month, and year.

ART. 83. From the original drawings made at the offices a cloth tracing shall be made, which shall be kept, without being doubled, for the purpose of taking therefrom the blue prints that have to be sent with the projects.

ART. 84. Plans shall be presented on sheets of a minimum size of 20 by 35 centimeters, and maximum ones of 70 by 100 centimeters.

ART. 85. The plans and drawings of all kinds shall be minutely annotated with marks or descriptive notes, having on each sheet the scale or scales used and an explanation of the conventional signs that may have been used. Each sheet shall be numbered, shall have a descriptive title, and the date and signatures of the maker and chief engineer.

ART. 86. The calculations of all kinds for the reduction of the field notes, the investigation and determination of the proportions of the work, the cubings of unities of work, supplies, prices, estimates, etc., must in every case be submitted to a competent person for correction. No calculation shall be admitted that lacks this requirement.

ART. 87. All the calculations referred to in the preceding article shall be made in blank copy books of 20 by 30 centimeters in size, approximately, and containing about 100 folios, made of a good class of paper that will stand the necessary erasures in the sketches that have to be introduced among the calculations. Every professional employee must have one of these blotters for his use, as the use of loose sheets is prohibited for calculations that refer to any study or work. There shall be entered upon the pages the name of the survey or work under consideration, the date, initials of the person making the calculation, and underneath there shall be written the word "corrected" and the initial of the person that makes the correction.

These blotters shall be numbered, shall have an index of the studies or works that they contain, and after being filled shall be placed in the archives, serving at all times for the purpose of clearing up any doubt, error, or difference that may occur in the works.

##### PRELIMINARY REPORTS.

ART. 88. In the preliminary reports, although accompanied by some estimate or some sketch or plan, they shall be all joined together as one sole document, which shall be sent to the director-general's office, the chief engineer keeping a copy of the same. The sketches or plans in question may be made by pen and sent on tracing paper or blue prints.

## PRELIMINARY PROJECTS.

ART. 89. The preliminary projects pertaining to preliminary studies shall consist of three documents—report, general plan, and estimates. These shall be forwarded to the office of the director-general in duplicate, who will return one copy with the observations that he may deem proper.

ART. 90. In the report the extent of and the manner in which the study or survey has been made, and in road work and other of similar kind a general description of the land will be given, giving reasons of the course chosen over others that might be selected, both under the point of view of the public service that the road will render, as well as respecting the conditions of the said course to the importance of the work and to the budget.

A descriptive review shall be given of all the work done in the preliminary project.

Concerning the work referring to culverts and bridges, the considerations that have served as a basis to adopt the proposed types shall be pointed out, specifying as to those of the greatest importance, the reasons for the designation of their foundations, and determination of their openings, forms, and dimensions.

A statement of the materials to be employed in the work shall be given, as well as the points and distance from the work where they are to be found.

ART. 91. The general plan shall consist of one of a scale of  $\frac{1}{50000}$  of the topography of the land under survey, in a zone more or less extensive, according to circumstances, and with the variations of level noted at every 2 meters, or at every 4 meters in very hilly lands; a longitudinal profile if it be a road or like work, on the same scale of  $\frac{1}{50000}$  for the horizontal plane, and of  $\frac{1}{5000}$  or of  $\frac{1}{2500}$  for the vertical plane, and besides such plans of works that must be studied to judge the approximate cost, without any necessity of details of any kind.

ART. 92. In the longitudinal profile there shall be established grades, and they shall be numbered in a manner indicating their percentage, the buildings that may be considered necessary, all of which, although subject to variation in the final project, shall be of sufficient exactness for the purposes of the preliminary project.

ART. 93. In preliminary studies transverse profiles are not exacted, as it will be sufficiently approximate to calculate the movement of the earth, supposing that the land is transversely horizontal and basing the area of each section on the difference between the established grade and the land at that point of the line, or that is, the the red line as is indicated in the profile.

ART. 94. The estimate sent must be contained on one or two pages, as it will simply consist of a transfer of the results of the work and calculations made from the field books hereinbefore mentioned.

Under headings of sections, rates, or isolated work into which the preliminary project may be subdivided, columns shall be ruled in which will be entered the different unities of work that have been estimated, kind or description of the unity, the material cost of the unity, partial cost, and total cost.

The sum of "total cost" will give the value of the material work, to which shall be added a percentage varying from 10 to 20 per cent as a profit for the contractor, and another percentage, probably from 5 to 10 per cent, for administrative and inspection expenses.

The sum total will be the estimate, or that is, the amount of the appropriation that may be considered necessary for the execution of the work.

## FINAL PROJECTS.

ART. 95. The final projects shall likewise comprise three documents—report, plan, and estimates—which shall be sent in duplicate to the office of the director-general.

ART. 96. The report shall be limited to treating of the variations or changes that may have been made with respect to the preliminary project and a detailed description of the work, giving the reasons that justify the dimensions, forms, foundations, etc., that have been adopted.

ART. 97. It will not be necessary to attach the detailed calculations that may have served for the determination of the work, as always reference may be had to them in the field books placed in the archives of the offices, but in many cases it will be proper to indicate the formulas that may have been used.

There shall also be stated the system that it would be proper to adopt for the execution of the whole or part of the work which should be contracted for, except in such exceptional cases in which the said system is neither convenient nor practicable.

In a like manner there shall be stated the order of preference to be followed in the carrying out of the work, the seasons and periods of time within which it may be done.

ART. 98. The plans shall be as complete in detail as possible, as they must, together

with the general conditions, be sufficiently clear to explain, without any room for doubt, the work that is to be done.

Arr. 99. The topographical plans of the lands and profiles shall be made to the scale and in the form described for preliminary projects.

The course shall be always indicated by dotted lines in the preliminary study, and by full lines in the final plan, marking the points of each P. C. and P. T. radius and length of the curves, length and corrected course of the tangents.

Arr. 100. The cross sections shall be drawn to a scale of  $\frac{1}{100}$ . In the blotters that remain at the offices and on plans that are forwarded with the project must be given the point to which each cross section belongs, the regular order of the grade, the height of the land, and the distance to the axis of the road at each point that it may be necessary to take it, which must not be less than three, one central and two lateral ones, where the slopes come in contact with the earth, and the area of clearings and gradings.

Arr. 101. For the calculation of the volume of clearings or gradings between two cross sections, the average area multiplied by the distance between the two cross sections shall be taken, and thus successively until the total volume of the section is obtained.

This simple method of calculation will give sufficiently approximate results for the purposes of the administration, and of course for those of contractors, to the benefit of whom the small excess of volume that this method of calculation may give over the true volume will accrue.

Arr. 102. The plans of building work shall be drawn to a scale of  $\frac{1}{100}$  for heights, ground plans, and longitudinal and cross sections, and of  $\frac{1}{50}$  to  $\frac{1}{10}$  for the details.

Arr. 103. The estimates shall be prepared in the same form as specified for the preliminary projects, using of course the cubic quantities that have been calculated with the more exact quantities of the final studies.

Arr. 104. In the project of works the same class of unity must be employed as many times as possible, with the object of having the least number possible, simplifying in this manner the problems, measurements, and payments to contractors.

Arr. 105. After the project shall have been returned and its execution by contract agreed upon, the general conditions shall be duly prepared, which shall be based on the approved project, with the modifications that may have therein been introduced.

Arr. 106. In the preparation of the general conditions, the printed form of the department shall be used, filling in at the proper places the blank lines or spaces, with reference to the advertisement, general instructions to bidders, and general conditions.

Following which there shall be typewritten the professional and economic conditions that shall be prepared expressly for each work.

To the said documents there shall be attached, with its blank spaces filled in, the printed form for proposals of the department.

The said document shall be sent in duplicate to the office of the director-general.

Arr. 107. The amount of the guarantee in cash, or in the form of certified check, that must accompany each bid shall be fixed within the tenth subdivision of dollars nearest to the amount of 1 per cent on the estimated cost of the work.

In every case \$30 shall be the minimum sum stipulated.

Arr. 108. The bids must express in writing and in figures the sum for each one of the unities of work that the project embraces.

Arr. 109. The articles of the professional conditions must contain a concise description of the works that are to be contracted for, a statement of the unities of work estimated, the same to be taken from the Budget; the conditions that the materials employed must possess, and the detailed method in which all work must be done; and, besides, all such special conditions of the work that may be deemed necessary.

Arr. 110. After a copy of the conditions shall have been returned approved, the engineer of the district will cause the number of copies to be printed that he may deem necessary, in accordance with provisions of article 145 of the regulations of the department.

Arr. 111. The director-general will send copies to the chiefs of districts of the conditions of all works that may be contracted for in the island, and of those that are obtained in foreign countries, for the purpose that each one may profit by the experience of the others. In the preparation of the conditions there shall be applied the articles of other works that may be deemed applicable to the case.

Arr. 112. There shall be sent to the director-general's office a copy of each one of the bids received, accompanied by the condition of award in duplicate.

The said condition must contain a comparative statement fixing the unities of each class or kind of work, taken from the project, and applying the prices per unity, of each bidder, and the total amount of each bid.

The chief engineer shall also recommend in his letter the bid that should be accepted, which will be the lowest one, except when there should be reasons for recommending that any other should be accepted, in which case he must state the said reasons.

ART. 113. After the contract shall have been awarded by the department, the chief engineer shall proceed with the preparation and signing of the contract, using for the purpose the official form of the department.

## APPENDIX H.

[Chief office of public works of the Pinar del Rio district.]

*Report of the results attained in each of the works, surveys, etc., in charge of this office, and of all kinds of expenses incurred, since March 1 up to June 30 last, and which is forwarded to the office of the secretary of the department, in compliance with article 25 of the rules governing the department of public works.*

MR. SECRETARY: Public works having been reorganized, and the undersigned appointed chief engineer of this province, being in charge since February 20 last, the office work was begun, receiving from Mr. Ricardo Molina, chief engineer of the Habana works, documents that existed in the abolished chief office of western region, corresponding to this under my charge.

On the 27th of the said month of February I moved from Habana to my residence in Pinar del Rio, trying to find a suitable place in which to install the offices of this section, and on the 1st of March following I began the work of organizing the service, disposing at the same time of the work relating to the same.

On the 12th of said month of March, the service already established, the offices were installed in their present location, Marti street 66, upstairs, and the matters in charge of this office were conducted with the cooperation of the district of Guanajay branch, in charge of Assistant Engineer Jose Agramonte.

### WORKS ACCOMPLISHED—REPAIRS, CONSTRUCTION, AND RECONSTRUCTION OF BRIDGES—COUNTRY ROADS.

In order to begin these works, which were of absolute necessity, I directed the firm of Viuda de Andres del Rio & Co., of Habana, to ship the pitch pine that had been contracted for, and bids were advertised for the transportation of the same, as well as for the necessary accessories required for the work on the bridges. While the bids were pending the approval of the superior authority, it was necessary to hire a suitable place to which the lumber was transferred. This being accomplished the work of repairing the bridges was begun, the nature and magnitude of that work being as follows:

#### COUNTRY ROAD FROM PINAR DEL RIO TO SAN JUAN Y MARTINEZ.

*Bridge over Rio Feo.*—The old planks were replaced with new ones, several ridge beams, crossbeams, lashings, rods, girders, railings, etc., using in all 22,280 feet of pitch-pine wood. Two coats of tar paint were given to the entire bridge, with the exception of the planks.

*Bridge over the Trancas stream.*—Not being able to commence the construction of this bridge at once as ordered, and in consideration that the bad condition of the crossing of this stream nullified to a certain extent the repairs of the other bridges, making the cartage of the necessary material almost impossible, a provisional bridge was built in said crossing, which up to the present has answered the purpose, facilitating public transit. In this provisional work 3,612 feet of pitch pine were used, which can be utilized in the permanent one which is about to begin.

*Bridge over Rio Seco.*—This bridge had the two ridge beams replaced, as well as several rods, crossbeams, and braces, all of the planks and a greater part of the railings. The approaches and arches were also repaired. In this work 4,245 feet of pitch pine were used. Two coats of tar paint were given to the entire bridge, with the exception of the planks.

*Bridge over San Sebastian River.*—Owing to the poor condition of all the woodwork on this bridge it was found necessary to replace same, using 21,544 feet of pitch-pine wood for that purpose. Besides repairing the arches two coats of tar paint were given to all the woodwork, with the exception of the plank flooring.



*Bridge over the San Juan River.*—This one was in the same poor condition as the aforementioned San Sebastian, it being found necessary to replace several ridge beams, crossbeams, rods, lashings, braces, girders, railings, and all of the planks, having used in this work 12,561 feet of pitch-pine wood, and two coats of tar paint, with the exception of the planks.

#### ROAD BETWEEN PINAR DEL RIO AND CONSOLACION DEL SUR BRIDGE.

*Over the Guama River in Pinar del Rio.*—Two days after the arrival of the undersigned he was informed of the poor and dangerous condition of this bridge, which was duly verified by a personal inspection, owing to which the inspector in charge of the Coloma wagon road was instructed to immediately proceed to make certain provisional repairs in order to avoid the inconveniences and dangers to which the public had to submit. Said repairs were ably accomplished by the said inspector, using 1,251 feet of pitch-pine wood.

*Bridge over the Gamua River in Paso Viejo.*—To this bridge, which had lost one of its corner arches, due to an overflow of the river, a 14.50-meter span was added, and a new arch and approach was built, besides replacing several parts which were in bad condition, such as ridge beams, rods, and all of the planks, which were in a very bad condition. Two coats of tar paint were given to the entire work, with the exception of the planks. In the aforementioned work 21,568 feet of pitch-pine wood, 13.50 square meters of lime, 81 square meters of stone, 30 square meters of sand, and all the necessary earth for the approach were used.

*Bridge over the Ajiconal River.*—For the same cause as the former, this bridge lost one of its arches, owing to which it was necessary to build a new one of masonry work with its corresponding approach, besides two new spans of 10 meters each, and replacing several parts that were in bad condition, such as lashings, ridge beams, crossbeams, and all of the railing and planks. In this work 23,274 feet of pitch-pine wood, 16.80 square meters of lime, 167.75 square meters of stone, and the necessary earth and sand were used.

*Deposit for tools and supplies, and stables.*—Being in need of an adequate place in which to deposit the utensils, tools, and material, as well as to stable the animals and vehicles belonging to this branch, used in the repairs, construction, and reconstruction of bridges and preservation of the roads of this city to Coloma, a lot situated near the railroad station, between Mendez and Nunez and California streets, was leased. It measures 27.63 meters front, by 90.61 meters deep, in which a pitch pine wooden stable was built, with asbestos paper roofing, of 3.41 square meters deep by 21.41 meters front, with the following partitions: One room 3.41 by 3.24 meters for the man in charge, a storeroom 3.41 by 4.27 meters for horse feed, five stalls 3.41 by 2.41 meters each, a carriage house for the buggy used by this office 3.41 by 3.10 meters. The lot has been fenced with barbed wire on the sides and with boards in the front and rear, with large doors both in front and rear, 4 meters wide. The location and hygienic conditions of this department are excellent.

#### GENERAL SURVEYS.

*Survey of the road from Bahia Honda to Consolacion del Norte.*—On the 1st of June this office received superior orders to proceed with the survey in question. At the same time Mr. Juan G. Peoli arrived to take charge of the work under the direction of the undersigned, who directed him to recommend the necessary personnel and to organize the commission that was to begin to work within a short time, which he did with zeal and intelligence. The measurements commenced on the 10th, and on the 30th of the same month of June 11 kilometers and 280 meters had been measured, this being accomplished in fourteen days, if the holidays and the time spent by the employees in moving their encampments are taken into consideration. The obstacles met by this commission are many, among them being the necessity of obtaining the provisions from Habana and the abandoned state of the roads in which they work, having to build narrow paths in order to use the apparatus.

#### SURVEYS FOR THE CONSTRUCTION OF THE BRIDGES ON THE SAN JUAN Y MARTINEZ ROAD.

*Bridge over the Galiano stream, Pinar del Rio.*—The natural conditions existing in the flow of this stream made it necessary to make a detailed survey, which was accomplished by assistant engineer, A. E. Eduardo Sola. Said survey consisted in the measurement of the three distinct crossings of the stream and of the plans for the construction of the bridges over the same. The lack of time has not allowed this office to examine them in order to select the one which is to be submitted for superior approval.

*Bridge over the Trancas stream.*—The measurements have been made and the most suitable place has been selected for the construction of a bridge 40 meters in length by 4 meters in width. The corresponding project which has been prepared has not been forwarded to the superiority for the same reasons as that of the preceding bridge.

*Streams and bad places which have to be crossed.*—The measurements of the streams and bad places that have to be crossed on the road from Pinar del Rio to San Juan y Martinez, known as "Arroyo Colorado," "Tio Pilar," "Arroyo del Medio," "La Pescadora," "Cura Maguey," and "Perico" have been made.

*Road from Guane to Paso Real, bridge over Bagazal stream.*—The condition of the Bagazal bridge has been examined, and an estimate made of the cost of repairs, which has not been examined by this office for want of time, and therefore has not been submitted to the superiority.

*Measurement of the work completed in the projected narrow-gauge railroad from La Soledad to Los Baños de San Diego, accomplished by the concessionary.*—The measurements ordered by the superior authority were made for the purpose of proceeding to the seizure of the work through lack of compliance with the conditions of the concession, and they were handed in to the said authority, which returned them from their lacking certain requirements of legal character, and which, although not included in the report, were ordered in the proceedings. In a short while the report will be handed in in the manner prescribed.

#### PRIVATE WORKS.

*Receipt of a dock and warehouse at Cortes Inlet.*—Having been ordered by the department under your worthy charge, the undersigned proceeded to receive the dock and warehouse situated in the aforementioned Cortes Inlet, of which Messrs. Fueyo & Suarez are the concessionaries. Said works were built as per approved plan with some slight modifications, which fact was duly recorded in triplicate and forwarded to the superior authority for its approval, and two copies having been returned, one one of them was delivered to the concessionaries.

*Inspection.*—During the four months from March 1 to June 30 of the present year the undersigned made all the necessary inspections of the work carried on by the branch of public works within this province.

*Receipt of material.*—The lumber, ironwork, utensils, tools, etc., required for the construction and reconstruction of the bridges and country roads of this province were received.

Before detailing the work accomplished in the preservation and repairs of the turnpikes this office deems it its duty to inform the superior authority that it has had to contend with the lack of means of transportation, as well as with the lack of laborers

#### WORK ACCOMPLISHED BY THE PERSONNEL ON THE TURNPIKES IN THE PROVINCE OF PINAR DEL RIO FROM MARCH TO JUNE, 1900, INCLUSIVE.

The Guanajay section having been established on the 24th of January, 1900, for the preservation and repairs of the turnpikes of that district, the works were begun by the personnel of that office on the 7th of the following month of February, beginning with a general inspection of all the turnpikes in that district, resulting in a report being written, which comprises: (1) General inspection of the work accomplished in the second and third sections of the road from Habana to San Cristobal, Kms. 30-92; road from Guanajay to Mariel, Kms. 1-13; Cabanas branch, Kms. 8 to 20. (2) An exact examination of the condition of the roadbeds of the turnpikes. (3) Inspection of the section houses for the service of said turnpikes.

This report served as a basis for the preparation of approximate estimates for the repairs of all the construction works, of all the roadbeds, and for the repairs and reconstruction of the section houses, the total amount of said estimate being about \$202,000. It took from the 7th of February to the end of March to accomplish these works. The work accomplished in February has been reported by the office of the western section.

During the month of March plans for the repair of culvert No. 1, Km. 36-37 of the road from Habana to San Cristobal were made, and the work of preparing the support of the bridges Yaguasa and Rio Hondo was begun. Besides attending to the general run of the office, reporting on building permits, the accounts of the different inspections, etc., different receipts of stone were also attended to.

During the month of April the necessity of the scaffolding to be used in putting together the bridges Yaguasa and Rio Hondo were made and the organization of the works for the same was proceeded with, examinations and inspections of the partial works of preservation in the roads were made, and the work of repairing Kms. 33-38 of the road from Habana to San Cristobal was commenced, several loads of crushed

stone having been received for the repairs, as well as for mending purposes in several other places. The business of the office was kept up to date, and the archive was organized.

During the month of May the preparation for the work of building the bridges Yaguasa and Rio Hondo was continued, making the project of modification in the arches. Lumber was ordered and assistance was rendered in unloading the bridges and in transporting the same to the place where they were to be put together. Several examinations of partial sections of preservation were made. Some stone was received, and the business of the office was kept up to date.

During the month of June the work of putting together the bridges Yaguasa and Rio Hondo was continued, and stone was received for the repairs in the Caimito. The survey of the Quebra-Hacha branch was begun for the purpose of reporting the condition of the works; data was taken as to the condition of the work on Guanajay to Cabanas road, Kms. 20-27, that were in possession of the American forces, in order to prepare its delivery to the branch; the organization of the archive was completed; the business of the office was kept up to date, and several official drawings were copied.

The work accomplished in the three sections of the turnpikes of the Guanajay district and in the turnpike of Pinar del Rio to la Coloma during the same period were the following:

*Statement.*

<b>Ditches and paths:</b>	
Linear meters of ditch opening .....	2,558,000
Square meters of paths repaired and ditches cleaned .....	873,244,000
<b>Stones:</b>	
Cubic meters of cut stone and stored by administration .....	74,000
Cubic meters of stone carted to different places to be used in repairs .....	668,800
Cubic meters of measured stone .....	238,500
Cubic meters of stone in piles .....	30,000
Cubic meters of quarried stone .....	6,000
Square meters of stone spread for road repairs .....	5,234,000
Square meters of stone rolled, sprinkled, and used for filling .....	5,986,000
<b>Earth and sand:</b>	
Cubic meters of earth and sand carted to different distances (from 300 to 1,500 meters) ..	1,050,000
<b>Planting of trees:</b>	
Trees planted on the edge of the roads .....	588
Seeds of different kinds planted .....	14,200
<b>Transportation:</b>	
Labors employed in the transportation of articles and material for the requirements of the branch .....	6

*Other works.*—The following works have been accomplished: Construction of 13 meters of drain sewer of 0.60 by 0.15. The well of the section house, Chicharron, was cleaned. Several carpentry works were made. Rails were taken from the Candelaria fort which were the property of the branch. The roof of the Chicharron section house was repaired. All the rolling stock in bad condition was gathered for the purpose of utilizing it in carpentry work. The bridge over the Cañas River was painted. The bridges Yaguasa and Rio Hondo were unloaded and transported, as well as the material used in putting them together.

*Office work.*—All of the business pertaining to the branch, that of the central office of the district as well as that of the inspection in each of the three sections, has been kept up to date.

*Recapitulation.*—One hundred and twelve kilometers of roads have been preserved, in which there have been piled, crushed, and spread by administration 80 cubic meters of stone; 238 cubic meters of stone cut by contract have been measured; 668,800 cubic meters of stone for repairing purposes have been carted to different places, and 5,234 square meters of partial sections have been repaired, all of which has been sprinkled, rolled, and filled in. Paths have been leveled and ditches have been cleaned, representing a superficial area of 873,244 square meters. Five hundred and eighty-eight trees have been planted and 14,200 seeds of road trees. Two thousand five hundred and fifty-eight meters of ditches have been opened, these excavations causing 1,050 cubic meters of earth and sand to be used in grading and laying out anew the paths, edges, etc. Besides all the other works which have been already mentioned.

*Statement of expenses from March 1 to June 30.*

Installation of the chief office .....	\$650.00
Personnel of the chief office .....	1,758.00
Office supplies .....	106.75
House rent .....	218.00
	<hr/>
	2,732.75

Repairs, construction, and reconstruction of bridges:	
Personnel and wages.....	\$8,860.39
General account.....	12,700.51
	<u>21,560.90</u>

## TURNPIKES.

Preservation, and repairs:	
Personnel.....	10,580.35
General account.....	4,683.73
	<u>15,264.08</u>

Repairs of the kilometers 33, 34, 36, 37, and 38 of the San Cristobal:	
Personnel.....	48.00
General account.....	1,185.86
	<u>1,233.86</u>

General surveys.	
Personnel.....	734.62
General account.....	965.22
	<u>1,699.84</u>

Recapitulation:	
Chief office.....	2,732.75
Preservation and repair of turnpikes.....	15,264.08
Repairs of kilometers 33 to 38 of the San Cristobal.....	1,233.86
Repairs of bridges and neighboring roads.....	21,560.90
General surveys.....	1,699.84
Total.....	<u>42,491.43</u>

NOTICE.—Of these expenses the following amounts are pending payment:

Office supplies.....	6.55
Repairs, etc., of turnpikes.....	4.00
Repairs of kilometers 33 to 38.....	22.66
Repairs, etc., of bridges.....	7.86
General surveys.....	41.26
	<u>82.33</u>

*Work considered necessary and which should be made during the present fiscal year.*

## TURNPIKES.

Second and third sections of the Habana to San Cristobal:	
Repairs to the roadbeds.....	\$50,000.00
Repairs and reconstruction of bridges and culverts.....	40,000.00
Repairs and reconstruction of laborers' section houses.....	10,000.00
	<u>100,000.00</u>

Pinar del Rio to Coloma:	
Repair of the roadbeds.....	20,000.00
Reconstruction of the bridge crossing the Guama River.....	5,000.00
Construction of five section houses.....	11,000.00
	<u>36,000.00</u>

Cayajabos branch, which joins the second section of the road from Habana to San Cristobal:	
Construction of this branch.....	75,000.00
Quiebra Hacha branch, which joins kilometer 15 of the Guanajay road to Cabañas:	
Completion of the works of this branch.....	25,000.00
	<u>100,000.00</u>

NOTE.—The cost of works on road from Cabañas to Bahia Honda, is not herein stated because the estimate is now being prepared.

Highways:	
Repairs of those sections in bad condition, and repairs and construction of bridges, culverts, and gradings.....	200,000.00
Completion of the works of bridges approved by order 231 from those general headquarters of December 4, 1899.....	21,047.52
Nine bridges approved by order No. 246 from those general headquarters, dated December 19, 1899.....	49,638.80
	<u>270,686.32</u>
General surveys.....	17,000.00

\*The cost of the completion of these works is not herein stated because they are at present being measured for that purpose.

## REPORT OF MILITARY GOVERNOR OF CUBA.

95

*Estimate of expenses of this chief office during the fiscal year.*

Personnel of the chief office .....	\$5,379.96
Office supplies .....	300.00
Rent of house.....	720.00
	<hr/>
	6,399.96
Turnpikes:	
Preservation .....	\$36,000.00
Repairs of the kilometers 33 to 38 of the Habana to San Cristobal.....	4,549.14
Reconstruction of the bridges Yaguasa and Rio Hondo in the third section of the San Cristobal .....	2,774.50
	<hr/>
	43,323.64
Total .....	49,723.60
Railroad inspection.....	300.00

Not having been able to examine all the roads in this province, I have had to depend largely on the reports furnished by the most respectable residents of the various localities, in order to form an idea of the repairs that were necessary. I have also been guided by the numerous petitions which have reached this office, requesting repairs and other works on said roads. This department is of the opinion that neither were exaggerated.

ESTEBAN DUQUE ESTRADA,  
*Chief Engineer.*

PINAR DEL RIO, CUBA, *August 10, 1900.*

*Statement showing the salaries and wages in all kinds of work done in the province of Pinar del Rio, district of Pinar del Rio, during the last fiscal year.*

Name of work.	Salaries and wages.												
	Engineer (monthly).	Second assis ant (monthly).	Inspector (monthly).	Clerk (monthly).	Carpenter (monthly).	Machinist (monthly).	Fireman (monthly).	Carpenter (daily).	Mason (daily).	Journeyman (daily).	Road walker (monthly).	Cartman (daily).	Messenger (monthly).
Preservation of the roads of the province .....	\$150	\$100	\$88.33	\$60	\$42	\$90	\$45	\$2.50	\$2.50	\$0.80	\$36	\$0.90	\$30

*Statement showing the cost of unities of works of all kinds done in the province of Pinar del Rio, district of Pinar del Rio, during the last fiscal year.*

Name of work.	Price per unity of work done.																		
	Grading.	Exca- vation.		Leveling of paths.	Masonry work.				Build- ing.		Spreading with sand.	Telford base.	Crushed stone (under administrative man- agement).	Fence.	Opening of new ditches.		Kilometric posts.	Grading of paths and cleaning of ditches.	Loading, hauling, and unloading stone.
		Earth.	Rock.		Dry.	Ordinary.	Agreed upon.	Hydraulic.	Of brick.	Of ashlar.									
Preservation of the roads of the provin- ce.....	m <sup>3</sup>	m <sup>3</sup>	m <sup>3</sup>	m <sup>2</sup>	m <sup>3</sup>	m <sup>3</sup>	m <sup>3</sup>	m <sup>3</sup>	m <sup>3</sup>	m <sup>3</sup>	m <sup>2</sup>	m <sup>2</sup>	m <sup>3</sup>	l. m.	l. m.	no.	m <sup>2</sup>	m <sup>3</sup>	
	.....	.....	.....	0.01	.....	.....	.....	.....	.....	.....	0.02	.....	0.18	.....	0.125	.....	0.006	0.54	



*Statement showing the salaries and wages in all kinds of works done in the province of Pinar del Rio, district of Pinar del Rio, during the last fiscal year.*

Name of work.	Salaries and wages.													
	Engineer (monthly).	Second assistant (monthly).	Inspector (monthly).	Foreman.	Clerk (monthly).	Boss (monthly).	Machinists (monthly).	Fireman (monthly).	Carpenter (daily).	Mason (daily).	Journeymen (daily).	Road walkers (monthly).	Cartmen (daily).	Messenger (monthly).
Preservation of the roads of the province.....	\$150	\$100	\$83.33	....	\$60	\$42	\$90	\$15	\$2.50	\$2.50	\$0.80	\$36	\$0.90	\$30

## APPENDIX I.

[Translation.]

*Descriptive report of the work done during the fiscal year 1899-1900 that the chief engineer of the district of Habana presents to the honorable secretary of public works.*

SIR: At the commencement of the fiscal year 1899-1900, it may be said that the new era of public works, heretofore almost completely abandoned by reason that the former government not only neglected to furnish sufficient funds for the undertaking of works of indisputable public utility, but even for the maintenance and preservation of those already existing or begun was inaugurated. The war took place and the abandonment was almost complete, such works only as the government could utilize for the movement of its troops being attended to, the repairs consisting of, or rather being limited to, the immediate vicinity of the capital or of other fortified places.

Peace came and American occupation on the 1st of January, 1899. One month later the new secretaries of the governor-general were appointed and the department of public works again commenced its functions. The month of February passed in the making of appointments and distribution of employees and then the following months until June inclusive in the organization, cognizance, and inspection of work, attending to matters of most necessary repairs, and replacing, although in some cases provisionally, certain culverts and pontoons in the province of Pinar del Rio that had caused the interruption of traffic on the road from Artemisa to San Cristobal.

In these badly written and limited remarks, honorable secretary, I have wished to say to you not only in confirmation that during the year just ended the new era in public works commenced, but also that little or nothing could be done in the second part of the last fiscal year, the first steps of the first period of American intervening government aided by the best wishes of this country's sons which still continues to be under intervention, the reason whereof being the period of organization through which public service had to pass, the old system that had to continue, if for only the first short periods, the most pressing necessities which from their nature demanded the greatest attention from the rulers and the timidity of the latter in granting the necessary appropriations, also justified by the lack of knowledge of the amount of moneys that the public treasury might receive.

Before continuing I wish to explain that although I have used the words "public works" in general, respecting which it is not my duty nor on which should I make any report, it is also true that in those first months, almost solely to the Occidental region could attention be given where, even among the reduced number thereof, the greatest works were carried out and I pass on to the report of work done during the fiscal year just ended.

At the commencement of the year the island was divided in connection with public works into regions and, later on, from the 1st of February last, into provinces;

therefore, it is proper for the undersigned to report upon the works of the occidental region and of the province of Habana in the following manner:

#### PRESERVATION AND REPAIR OF TURNPIKES.

The appropriations having been increased at the commencement of the year, the purchase of effects, utensils, manufactured articles, steam rollers, carts, mules, etc., was proceeded with in order to be able to undertake the different works shown in detail in the accompanying statements, and it only remains to describe the manner in which they were carried out, viz: Such works as grading and cleaning of walks and ditches, opening of the same, and laying out the walks anew. The work was done by administration and under the system of tasks usually marked out weekly by foremen and inspectors, the distance marked varying with each individual according to the greater or less amount of work therein according to the judgment of the inspectors. The said work is generally done by road walkers, and on computing the said tasks, whether same have increased or diminished, this fact is taken into account for the payment of the salaries of said laborers, no deductions being made in cases of absence if there should be any increase to compensate it, but said deduction for absence is made whenever any decrease in the work has taken place. The other works enumerated in the statements or tables have been done under administrative management, with the exception of the hauling of stone for filling in holes, repairs to the roadbed, the transportation of stone and covering, and the repair of some section houses, which have been generally done under the contract system or by written agreement.

Among the repairs made on the greatest scale during the year on different roads, there are kilometers 18-20 and part of kilometers 17, 21, and 24, of Guines road; kilometer 8 and parts of 9, 10, 14, 24, 26, and 32, of San Cristobal road; 19, 20, 21, 22, 23, 24, and 25, of Bejucal road, and kilometers 18, 19, 20, and part of kilometers 12, 13, and 17, of Managua road, which form a total of 16,942 linear meters, or practically 17 kilometers, which have been carried out generally by means of the system of contract for the hauling of stone and by means of administrative management for the spreading, rolling, bedding, sprinkling, etc. The steam rollers were received, the first in the month of October last and the other two in December, and although they have not been constantly worked from having been employed in mendings, one of them having been loaned for the rolling of the streets of Quemados, Marianao, and the road from Cano to Wajay, and another stopped for more than a month on account of breakage, it can be assured that the work done by the same has been satisfactory and economical, and without any increase of the existing means. All the roads that are at the present time in operation can be repaired every five years.

The total number of cubic meters of stone collected at the different points of the repairs done under the systems of contract, amount to 15,672 at a cost of \$37,858.95, or that is, at the rate of \$2.415 per cubic meter.

#### PONTOONS, BRIDGES, AND CULVERTS.

Among the different works done (all under administrative management) on bridges, pontoons, and culverts, there is shown in the province of Pinar del Rio, the repair of the wooden floor and railings of Medina bridge (done under written agreement) on the road from Pinar del Rio to Coloma, and the repair of railing and stringers of pontoons at kilometers 70 and 91 on the road from Habana to San Cristobal; in the province of Habana as new work, the building of a new culvert with 2 meters opening, with ordinary mason work, and bricks and covered with old rails, and 2 drains of 0.70 meter opening, built of brick and old rails, at kilometers 20 and 23 on the turnpike between Habana and Bejucal. The brick arch that was in a bad condition at pontoon de Anafe, having 4.14 meters opening, was changed to a covering of old rails and I steel beams with macadamized covering, and in the same manner that of pontoon Santa Cruz of two 5.55 meter openings, which had a wooden covering that was not only in a bad condition, but had really caved in in some places, both arches being situated on the road from Habana to Cristobal. There was purchased from the Youngstown Manufactory through Messrs. Sussdorff, Zaldo & Co., who were the lowest bidders, a metal section of boiler plate girders of 60 English feet in length, to be placed, as was afterwards done, over the River Martin Perez, at kilometer No. 5 of the road from Luyano to Gallega. This bridge after it was finished was tested by means of a steam roller belonging to the department, the test showing a central deflection of  $3\frac{1}{2}$  millimeters, after the steam roller, which was estimated to weigh 15 tons, had remained in one place for ten minutes, and a deflection of 4 millimeters when the steam roller was run over it at its highest speed, the bridge returning to its normal condition as soon as the weight was removed in both cases. Besides,



owing to the steam rollers having to be employed at different works it was necessary to strengthen the wooden floors of the Canongo and Chorrera bridges, both of them over the Almendares River, at the San Cristobal and Managua road crossings, respectively. A part of the sidewalk and railing of the Bacurano bridge was repaired. The water courses were opened and cleaned for purposes of better drainage, among them culvert No. 7 of the Managua road, sundry ones on the Bejucal road, with the removal of 753.8 cubic meters of earth, and at the Calabazar bridge by removal of 956.3 cubic meters; the railings of the Arroyo Apolo and Bejucal bridges were replaced by new ones; the wooden floor of the latter was repaired, as well as the wall and abutments of a culvert at kilometer 23 on the same road. The Chorrera bridge abutment that had become out of level was blocked up and repaired, there having been employed in the said work 12 cubic meters of hydraulic cement and 24 of stone filling.

#### SECTION HOUSES.

In view of the abandoned state in which the station houses of road walkers were, and the complete lack of others that were destroyed during the war, important work has been done on them, and the necessary amounts expended for their preservation, hygiene, occupancy, and safety—the latter amounting to the sum of \$4,276.55 in the province of Habana. Almost all the work has been done by administrative management, among which is the building of a new frame section house of four rooms at kilometer 43 on the Guines road at Lomas de Candela. The section houses at La Lisa, and at kilometer 45 on the Guines road were taken down, transported, and put together again at other places; those at Puentes Grandes, La Lisa, Arroyo Arenas, Macasta, Calabazar, Arroyo Apolo, Santiago de las Vegas, Rincon, Chorrera, Dique, and Cruz de Piedra were whitewashed, painted, and doors, windows, partitions, and plastering repaired, as well as leaky roofs, all being contracted for at a lump sum. Three new rooms were built at section house at Puentes Grandes as well as passage-way and shed, and one room at La Lisa station as well as an ox stable, one room and a privy at Macasta. There were made and placed the gates for station houses at Arroyo Arenas, Macasta, Arroyo Apolo, Rincon, Dique, San Pedro, and Lomas de Candela; strips were nailed over the joints of the front of Arroyo Apolo station, fences rebuilt, and a new roof put on the privy; the well at Santiago de las Vegas was cleaned; five posts were spliced, and the gate frame at Chorrera station house was taken out, shortened, and returned to place; stone flooring was put in at Macasta station, the posts were taken out, holes filled in, and all the materials of the ex-station at Punta Brava were removed, and that of Martin Perez was taken down and rebuilt anew.

In the province of Pinar del Rio there was a total expenditure of \$2,013.59. The works that were done under the system of contract or lump sum were as follows: The covering of the main body—two rooms, kitchen, and privy—the hanging of doors and windows, whitewashing, painting, etc., utilizing the walls that were left standing after the war at Chapotin station, and the roofing, hanging of doors and windows, painting and whitewashing at five stations on the road from Pinar del Rio to Coloma, utilizing the materials from the blockhouses. Under administrative management there were taken down, transported, and again put together, after being repaired, whitewashed, and painted, three portable station houses, two that were at Artemisa (K. 58), and one at kilometer 63. At kilometers 61, 67, and 71 of the road from Habana to San Cristobal, roofs and plastering were repaired, whitewash and paint given to those at Chicharron, to those at kilometers 48 and 89 at San Cristobal, and at Canitas on the Mariel road; the privy was cleaned, and the floor tiled at Chiccaron station; there were made and transported to the kitchen at Chapotin station two chimneys and a bell; the floor and railing at Canitas were repaired; a roof was put on, and doors and windows hung on the walls of three rooms that remain of the Rio Hondo station; pumps were placed at Mangas and Bayate station, and at kilometer 71 at San Cristobal, and the material was purchased and forwarded for the building of three rooms and a privy at the Mangas station.

#### SURVEYS, EXAMINATIONS, ETC.

Among the studies carried out during the year are the following ones: The prolongation of the road from Managua to the port of Batabano, passing through San Antonio de las Vegas, Duran, and Batabano, having a length of 35,461 meters, with two branches, one 1,720 meters and the other 1,040.14 meters long, making a total of 38,221.14 meters. Studies were also carried out for a road which, leaving Rincon and passing through San Antonio de los Banos, would end at Guira de Melena with a branch in the direction Alquizar. This survey had not been finished yet at the end

of the year, it having extended for only 12,715.05 meters from Rincon to San Antonio de los Banos, for 12,389.09 meters from San Antonio to Guira de Melena, and for 4,000 meters on the branch toward Alquizar, which had to be annulled on receiving later the route indicated by the department, the said survey amounting to a total of 29,104.14 meters. Besides levelings had been made in the roads throughout a length of 40,000 meters in connection with the different repair projects, among which are those from kilometers 18 to 25 on the road from Habana to Bejucal; from 12 to 20 on Managua road; from 20 to 27 on Guines road; from 3 to 11 on San Cristobal road, on the branch road from Cuatro Caminos to Canoa, and the road from Punta Brava to Cangrejas, also performing for all these projects the corresponding office work, such as the preparation of general conditions, plans, etc., and the plan and profile of the said prolongation from Managua to the port of Batabano.

The following examinations have been made in their greater part for the purpose of making report thereon to the department, and by its orders roads from Guines to Carolina, from San Jose de las Lajas to Tapaste, and from the latter point to the towns of Jamaica and Cuatro Caminos, as well as those from Canoa to Wajay and from Punta Brava to Cangrejas; charge was assumed, by order of the superior authorities and at the petitions of the ayuntamiento of Batabano, of the road which leaves the said town and ends in the port of the same name, the corresponding project for its repair having been made; there was also made an examination of the river Ariguanado, brought about by a petition of the ayuntamiento of San Antonio de los Banos for its cleaning.

In connection with the inspection of railroads there was an examination made of the crossing of grade of the Vedado road over the Habana electric railway, due to an accident that occurred to an omnibus belonging to the La Union Company, another of the stations of San Nicolas and Las Vegas, and of the section of road between the same, in order to be able to report to the department in regard to a petition presented to it by the mayor of San Nicolas complaining of the lack of guards at crossings and of the bad condition of the platforms of said stations; another near to the railroad (Western) station where requests for permission to build an ice factory had been made, and another at the crossings at grade known as "Mata Siete" and "Cambute" on the Regla line of the United Companies of Habana, making a sketch in order to report in regard to the guards for said crossings.

Examination of sundry crossings at grade on the branch from Empalme to Madruga in accordance with the request of the municipal mayor of the last-named place to the effect that the United Railroad Companies of Habana should place thereat road crossing guards; another of the Villanueva station yard, in order to be able to report as to the works that the company should do to prevent the switching and making up of trains outside of the said railroad station yard, and another at the town of Alquizar of the building lots there belonging to the Western Railway of Habana, making a plan of the same for the purpose of making a report as to their situation and the use made of them by the said company, in accordance with the request from the director-general.

The new passenger railroad station at Taco-Taco was inspected on delivery as well as the warehouse for merchandise at kilometer 111 on the Western Railway of Habana, and at the San Antonio de los Banos station of the United Railway of Habana an investigation was made for the purpose of reporting to the department as to the garbage transported by the aforesaid railroad to the town, which had been objected to by the municipal mayor, which had brought forth a protest from the general manager of the company.

Besides, reports have been made on 54 matters of requests for building permits after first having examined the localities, the same being distributed in the following manner: 23 on the road from Habana to San Cristobal; 8 on that from Luyano to Gallega, 14 on the Guines road, 2 on the Bejucal road, and 7 on that from Arroyo Apolo to Managua.

#### OTHER WORKS.

Among other works, all carried out under administrative management, are the following: The building of a fence at kilometer 5 of the road from Habana to San Cristobal, for the purpose of removing the danger that existed at the descent of the first Ceiba hill of a fast running vehicle falling into the precipice formed by the approach to the Canongo bridge on the right side of the Almendares River; the Ceiba ditch at kilometer 6 of the said road was repaired for a distance of 90 meters for the purpose of preventing the stagnation of the water; the proper grade was made to allow the latter to pass off by San Tadeo street, the necessity occurring of having to repave the bottom, repair the side walls, and the rifle pits that there were above; the ditches on the right side at kilometer 8 of the road from

Luyano to Gallega were leveled; there was also crushed a lump sum 2,929 cubic meters of stone on the road from Punta Brava to Cangrejas.

On a separate statement are shown the expenditures made and work done at the general warehouse, such as repairs to the building itself, repair of tools, utensils, wheelbarrows, carts, etc., the making of sprinkling tanks, the making of an iron tank for the Cape San Antonio light-house, packing cases, etc., all in addition to the works mentioned in the statements referring to the different roads. Statements are also herewith sent of the expenditures during the year for other purposes and a general recapitulation showing the total expenditures.

Yours, etc.,

R. F. MOLINA,  
*Chief Engineer.*



Section house, Puentes Grandes, km. 5.	Taking of steam roller to Calmito.....	48		92	2.14	9.00
	Hauling of top dressing.....					43.20
	Repairs of partitions, doors, and windows.....	52	1,318		25.30	42.29
	Painting of doors and windows.....					76.05
	Purchase of lime.....	7	295		42	3.60
	Mending roofs.....					16.40
	Mixing of concrete.....					6.48
	Grading of yard.....	10		50	5	13.76
	Hardware.....					78.09
	Purchase of lumber.....					79.45
Section house, La Lisa, km. 11	Purchase of tiles.....					2.35
	Purchase of bell for kitchen.....					7.00
	Making of 3 rooms.....					196.50
	Taking down, removal, and putting up of section house.....	35				28.00
	Purchase of tiles.....					5.40
	Building of a shed.....	12				7.77
	Building of a room.....					11.17
	Mending roof.....	4				4.72
	Mixing concrete.....					3.24
	General expenses.....					20.00
Section house, Arroyo Arenas, km. 14.	Mixing concrete.....					25.27
	Mending roof.....	8	40		5	18.36
	Purchase of lime.....					10.00
	Whitewashing.....	7	280		40	14.00
	Purchase of lumber.....					2.53
	Making and putting in gate.....					23.25
	Repair of damage.....	6		3	.50	9.44
	Purchase of a lantern.....					1.75
	Mason work.....	1		80	1	4.00
	Plastering.....	6				2.00
Ex section house of Punta Brava, km. 20.	Removal of materials.....	13				18.27
	Filling of holes.....	2				2.77
	Loading, hauling, and unloading of lumber.....	2				3.81
	Building of wooden fence.....	7			4.28	12.97
	Fixing sidewalks.....	4		2.7	.70	22.98
	Mortar.....					8.75
	Foundation.....	7	54		7.80	17.50
	Taking down old work and hauling materials.....	91				217.20
	Purchase of I beams and hauling from factory to general warehouse.....					320.20
	Purchase of rails and hauling same to the work.....					386.24
Fence, km 5. Repairs to ditch at Ceiba, km. 6.	Ordinary mason work at abutments and piers.....	30		27	1.10	172.44
	Purchase of sheets.....					335.54
	Cutting of beams and sheets.....					47.37
						6.38
Santa Cruz bridge.....						

16 posts of hard wood were taken out, as well as the gateway and 1 wheel guard.

*Statement showing the work done on the herein-named roads, province of Habana, during the fiscal year of 1899 to 1900—Continued.*

FIRST SECTION OF THE ROAD FROM HABANA TO SAN CRISTOBAL—Continued.

Name of work.	Subdivision.	Number of days' wages.	Meters.			Unity of work per days' wages.	Total cost.	Price of unity.	Observations.
			Linear	Square	Cubic.				
Santa Cruz bridge.....	Ordinary mason work on pillars.....	11			5	0.50	\$39.18	\$7.83	The metallic section is composed of 12 1" beams and flooring of rails and sheet-iron covering. The bridge has 2 bents of 5.55 ms. each, and is 5.50 ms. wide.
	Purchase of lime.....						32.40		
	Preparing mortar.....						16.80		
	Plastering.....	10		241		24.10	59.82	.25	
	Placing of metallic section.....	18					15.84		
Pontoon at Anafe, km. 29.....	Placing of railings.....	2					17.79		
	Painting beams, railings, and wheel guards.....	4					1.75		
	Purchase of lumber.....						17.38		
	Propping up of the old work.....	6					13.74		
	Purchase and hauling of lumber.....						21.30		
	Putting up a temporary bridge.....	3					6.67		
	Purchase of 1 beams and hauling.....						104.21		
	Taking down arch.....	23					29.98		
	Purchase of lime.....						10.80		
	Building of walls.....	15			13	.87	132.53	10.2	
	Purchase of cement.....						5.15		
	Purchase of hardware.....						32.24		
	Purchase of rails and hauling of same.....						251.40		
	Cutting of beams and iron sheets.....						29.88		
	Making two railings.....						9.00		
	Painting of beams and railings.....	2					4.80		
Total.....							18,487.96	96	

ROAD FROM HABANA TO BEJUCAL.

Preservation.....	General expense.....	466					\$997.83		
	Opening of ditches.....	710				5.30	850.50	\$0.22	
	Grading of walks and cleaning of ditches.....	2,013				82	2,572.80	.016	
	Loading, hauling, and unloading of stone.....	50		165,097		11.40	66.39	.12	
	Measuring of stone.....	7		572		10	5.40	.07	

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ROAD FROM ARROYO APOLO TO MANAGUA.									
Construction of walls.....								34.70	3.80
Hauling of dirt.....								3.60	
Purchase of lime.....								30.58	
Purchase of bricks.....								57.12	
Purchase of cement.....								13.50	
Purchase of rails.....								96.00	
Total.....								33,794.58	
Preservation .....	General expenses.....							\$691.14	
	Opening of ditches.....	83				971.4	11.7	304.47	\$0.31
	Grading walks and cleaning ditches.....	725	80,957				111.6	828.30	.012
	Loading, hauling, and unloading stone.....	181				984.8	5.4	172.52	.17
	Quarrying of stone.....	99				516.3	5.2	113.36	.21
	Crushing of stone.....	386				64.7	1.7	455.39	.70
	Bole filling.....	117	3,983				34	133.79	.033
	Excavation of earth.....							40.10	
	Gathering stone from pasture lands.....							20.16	.11
	Loading, hauling, and unloading earth.....	78				1,239.3	15.8	127.66	
	Hardware.....	11						73.90	
	Repairing doors and windows; mending 3 posts in stable and 2 in coach; taking down and reducing in size the frame of entrance and replacing same in position.....							22.20	
Section house, La Chorrera, No. 12.	Two coats of paint.....	9	160					22.15	.13
	Whitewashing.....	16	640					12.96	.02
	Hardware.....							11.15	
	Repair to floor.....							279.07	1.73
Bridge, La Chorrera, km. 12.	Opening and cleaning of water course.....	41				299.4	7.3	77.66	.25
Culvert, km. No. 12.	Pumping.....	10						16.00	
New foundation for Chorrera bridge at km. 12.	Lime cement and cost of placing.....	28				12	.4	39.65	3.30
	Stone cassion in front of abutment.....	8				24	3	19.50	6.60
	Leveling of ks. 12 to 20.....							7.56	
Securing information for preparation of project repairs at kms. 12 to 20.	Purchase of coal.....							139.90	
Repairs from Managua to Chorrera at kms. 12 to 20.	Spreading of stone.....	441	3,726				8.4	374.85	.10
	Purchase of water.....							30.97	
	Sprinkling.....	152						136.90	
	Steam rolling.....	189	3,696				19.7	384.50	.10
	Reimbursement of expenses.....								
	Spreading of top dressing.....	48	3,588					2.97	.005
	Receipt and placing of stone.....	256				6,614	25.9	43.20	.057
								381.75	

The steam roller was used 46 days, at the rate of 80.3 linear meters per day.

The gathering of stone was done by contract.

The steam roller was used 46 days, at the rate of 80.3 linear meters per day.

The gathering of stone was done by contract.

*Statement showing the work done on the herein-named roads, province of Habana, during the fiscal year of 1899 to 1900—Continued.*

ROAD FROM ARROYO APOLO TO MANAGUA—Continued.

Name of work.	Subdivision.	Number of days' wages.	Meters.		Unity of work per days' wages.	Total cost.	Price of unity.	Observations.
			Linear.	Square.				
Repairs from Managua to Chorrera at kms. 12 to 20.	Loading, hauling, and unloading of earth.	10			9	\$9.00	\$0.10	
	Hardware					21.55		
	Enlargement of walks.	47		1,487.5	31.6	37.60	.03	
	Loading, hauling, and unloading of top dressing.	26			3.2	23.40	.278	
	Amount of stone gathered					9,317.02	2.15	
	Purchase of top dressing					136.00	2	
	Total					14,507.00		

FIRST SECTION OF THE ROAD FROM HABANA TO GUINES.

Preservation	General expenses	675				\$866.73		
	Opening of ditches	296				356.10	\$0.270	
	Grading of walks and cleaning of ditches	1,177	42,444	82,390	75.74	1,413.19	.017	
	Quarrying of stone	260			2.10	281.44	.580	
	Stone piling					900.00		
	Loading, hauling, and unloading of stones				3.70	404.71	1.27	This hauling was done under contract.
	Crushing of stone					513.61	.70	
	Filling holes in road	407		4,735.5	40.13	1,055.40	.15	
	Excavation of earth					1.44		
	Removal of rifle pits	3			4.15	4.15		
Section house, Ginata km. 8.	Loading, hauling, and unloading of earth.	2			6.4	5.08	.70	
	Quarry dues					21.10	.10	
	Hardware				211	8.50		
	Work done by administrative management and by lump sum.					216.25		
	do					160.80		
	Purchase of lime					4.24		
	Hardware					27.80		
	Purchase of lumber					9.29		
	General expenses					136.00		
	Amount of stone gathered	283	1,583	7,915	28	379.20	.049	
Extra charge for kms. 17 to 18.	Spreading of stone	79	1,583		46	63.20	1.37	
	Top dressing and extent	70	1,583			56.00	.035	
	Sprinkling							



*Statement showing the work done on the herein-named roads, province of Habana, during the fiscal year of 1899 to 1900—Continued.*

SECOND SECTION OF THE ROAD FROM HABANA TO GUINES—Continued.

Name of work.	Subdivision.	Number of days' wages.	Meters.			Unity of work per days' wages.	Total cost.	Price of unity.	Observations.
			Linear.	Square.	Cubic.				
Repairs to kms. 20 and 21 ...	Sprinkling and rolling .....	224	1,140	5,700	.....	.....	\$258.60	\$0.226	In these repairs there has been an average of 48 ms. daily made of roadbed, a very small task, due to continued interruptions in the work through inexperience and negligence on the part of some operatives and to breakages of steam roller. The supply of stone for repair of roadbed has been furnished by contract.
	Securing supply of stone .....	.....	.....	.....	2,050	.....	4,100.00	2	
	Purchase of mules.....	.....	.....	.....	.....	.....	270.00	.....	
	Repairs to steam roller .....	.....	.....	.....	.....	.....	5.50	.....	
	Purchase of coal.....	.....	.....	.....	.....	.....	66.51	.....	In this spreading of 654 m. with a width of 5 meters and a thickness of 0.21 ms. in the center, 26 days of steam rolling was done, making an average of 25 meters daily. { This supply was secured at the rate of 22.42 c. m. daily.
	Reimbursement of expenses .....	.....	.....	.....	.....	.....	5.64	.....	
	General expense.....	51	.....	.....	.....	.....	72.59	.....	
Extra expenses at km. 24....	Spreading of stone.....	446	654	.....	.....	.....	585.49	.....	
	Receiving and selecting stone.....	.....	.....	.....	.....	.....	101.40	.....	
	General expense.....	42	.....	.....	.....	.....	.....	.....	
	Wages of laborers.....	35	.....	.....	.....	.....	620.23	1.79	
	Amount of stone credited to contractor.	.....	.....	.....	438	.....	.....	.....	
	Total .....	.....	.....	.....	.....	.....	14,179.85	.....	

ROAD FROM LUYANO TO LA GALLEGA.

Preservation .....	General expenses .....	350	.....	.....	.....	.....	\$443.43	.....	.....
	Grading of walks and cleaning of ditches .....	762	.....	60,960	.....	50	987.29	\$0.016	.....
	Opening of ditches.....	138	.....	1,396	418.80	3	161.95	.33	.....
	Quarrying of stone.....	5	.....	.....	16.65	3.33	4.29	.25	.....
	Loading, hauling, and unloading of stone.....	92	.....	.....	200	2.17	113.57	.56	.....

Crushing of stone.....	151			163.25	1.08	228.18	1.30
Hardware.....						143.59	
Filling of holes in road.....	130		2,232		17.17	140.14	.06
Excavation of earth.....	30			180	6	30.52	.19
Purchase of large stone.....						14.00	
Loading, hauling, and unloading earth.....	183			796.50	4.35	248.73	.31
General expense.....	24					33.69	1.40
Wages of carpenters and laborers in taking apart.....	7	80			7.27	18.91	2.70
Repair of floor and railing.....	41		168		3.81	82.68	2.01
Purchase of new floor.....						3,400.00	
Wharfage and transportation.....						97.28	
Carting to place.....	81					168.20	
Taking down one-half of the wooden bridge and moving the other half.....	128					153.60	
Hardware.....						75.92	
Wages of blacksmiths, machinists, and laborers in the putting together.....						289.00	
Painting, 3 coats.....	38		820.08		32.80	102.41	.048
Purchase of cement.....	25					39.50	
Spreading concrete layer.....				8		48.00	
Purchase of lumber.....						19.50	2.40
Hauling of sand.....	6			9	1.50	36.78	.77
Mason work.....	18					30.00	
General expense.....	8					11.31	
Blacksmith's wages.....	12		3.40		.28	27.04	2.25
Excavation and shoveling of earth.....	6					8.31	1.40
General expenses.....	118			419.3	3.55	164.58	.39
Wages of carpenters in the taking down of section house.....	60				35	84.00	
Wages of carpenters in straightening of posts and uprights and mending others.....	20		140			16.50	2.75
Wages in taking down sheds and removal of floors and replacing floor beams.....	28					55.00	2.70
Wages in nailing 2,188 feet of weatherboarding.....	8		202.8		25.25	82.50	1.75
Wages in putting in floor.....	4					22.00	.108
Wages in changing certain pieces in body and roof.....	6		81		20.25	11.00	.136
Wages in repairs to doors and windows.....	15		96		16	16.50	.17
Wages in building kitchen and privy.....	6					41.25	
Wages of workmen in taking down, cleaning, and replacing tiles.....	19					16.50	
Wages of helps to masons and carpenters.....	35					17.10	
Wages of masons.....						31.50	
Purchase of lumber.....	28					70.00	2.50
Hardware.....						86.44	
						9.70	

Taking apart the frame and repairing of bridge at Martin Perez.

Placing Martin Perez iron bridge.

Repair of floor and railing of Bacurao bridge.

Removal of rifle pits at km. 8.

Repairs by administration to Martin Perez section house.

*Statement showing the work done on the herein-named roads, province of Habana, during the fiscal year of 1899 to 1900—Continued.*

ROAD FROM LUYANO TO LA GALLEGA—Continued.

Name of work.	Subdivision.	Number of days' wages.	Meters.			Unity of work per days' wages.	Total cost.	Price of unity.	Observations.
			Linear.	Square.	Cubic.				
Section house at Cruz de Piedra.	Purchase of lumber.....						\$69.13		
	Hardware.....						63.37		
	Canals.....						17.20		
	Masonry.....						40.00		
	Painting.....						35.00		
	Wages of carpenters and laborers.....						95.46		
	Fixing pump and cleaning well.....						36.06		
	Total.....						8,186.51		

## GENERAL WAREHOUSE AND WORKSHOPS.

Blacksmith work.....	General expense.....	1,907					\$2,111.52		
	Making and repairing of 6 pipes for sprinkling and putting same together.	48					119.33		
	Building and repair of all kinds of carts and iron tanks for sprinkling.	231					582.49		
	Making 2 chimneys and repairing of forge.	15	4.88				47.40		
	Making of iron tank 2.44 ms. by 1.22 ms. by 1.22 ms. for Cape San Antonio Light-House.	54			3.63		84.60		
Carpentry.....	Repair to steam roller.....	34					86.30		
	Fixing clockwork, light-house.....	6					11.85		
	Mending of tools.....	59					147.49		
	Making of packing boxes for the general light-house warehouse.	10					26.43		
	Making of framework for windows of the general forage warehouse and privies.	5					13.50		
	Making hand wheelbarrows.....	64					182.30		
	Making of three platforms for forage warehouse.	3					6.75		
	Repairs of yokes.....	2					4.50		
	Making of two graduated road gauges with levels, for roadbeds.	10					26.50		
	Building of portable auxiliary bridge.	10					22.50		
	Making shelves for archives.....	8.5					21.00		
	Making box for steam roller No. 1.....	1					2.60		

Making of packing box for light-house lamp.	1					2.60	
Making of cubic meter boxes to measure stone.	14					35.24	
Fixing desk for archives.	8					20.80	
Making a box for roller No. 3.	3					7.88	
Fixing desk and office of storekeeper.	16					34.13	
Making packing boxes to contain the parts of archives to be sent to the provinces.	9					21.63	
Building of stand for tools in blacksmith shop.	10.5					27.00	
Cutting thread on screws.	6					15.80	
Painting of targets, indicators, and sights.	12					25.18	
Hardware.						1,222.40	
Purchase of lumber.						216.28	
Purchase of lime.						27.48	
Purchase of cement.						65.00	
Purchase of bricks.						21.00	
Making of two rollers.	3					7.50	
Making and repairing of "lucetas".	4					10.90	
Mending of roofs.	6					15.30	
Whitewashing.	31				74	28.86	\$0.012
Purchase of hardware.						22.05	
Removal of the light from the school of light-house keepers, putting up the same, and the shelving of the deposit in another room of the building.	51					129.30	
Repair of blinds.	7					17.50	
Repair of door frames.	13					32.50	
Making arches for doorways.	3					7.50	
Painting of doors and windows.	18				7.5	36.00	.03
Selecting pieces for bridges.	26					30.80	
Total.						5,577.63	
ROAD FROM PUNTA BRAVA TO CANGREJERAS.							
Repairs.					2,929	1	\$2,242.40
Crushing of stone.							310.66
Salaries of professional employees and laborers.							46.94
Reimbursement of expenses to professional employees.							2,600.00
Total.							

State building, Cerro district

*Statement showing the work done on the herein-named roads, province of Habana, during the fiscal year of 1899 to 1900—Continued.*

STUDY OF THE ROAD FROM MANAGUA TO THE PORT OF BATABANO AND PREPARATION OF THE PROJECT OF REPAIRS FROM THE PORT TO THE TOWN.

Subdivision:	
Salary of professional employees and laborers.....	\$1,451.95
Reimbursement of subsistence expenses and sundry others.....	\$1,296.22
Total.....	1,688.17

SURVEY OF THE ROAD FROM SAN ANTONIO DE LOS BANOS TO GUIRA DE MELENA AND ALQUIZAR.

Subdivision:	
Salaries of professional employees on these studies.....	\$655.30
Reimbursement for subsistence and other expenses.....	126.12
Total.....	781.42

GENERAL EXPENSES OCCURRING DURING THE FISCAL YEAR OF 1900 IN THE PROVINCE OF HABANA.

Purchase of—			
Cattle.....	\$2,847.50	Employees on roads.....	\$4,443.72
Harness and leather goods.....	489.45	Freight of rails.....	5.72
Coaches and wagons.....	940.00	Advertisements for forage, telegrams, and petty expenses.....	33.31
Three rollers.....	11,893.10	Office supplies.....	211.12
Forage.....	3,508.94	Purchase of—	
Metal bridges and transportation for the rivers Hondo and Yaguasa.....	9,182.24	Typewriter.....	120.00
Coal.....	425.24	Photographic apparatus.....	40.00
Jack (lifting).....	27.15	Instruments.....	586.18
Reimbursement of expenses.....	2,273.35	Blank forms.....	86.50
Reimbursement of expenses, railroads.....	7.43	Photographic supplies.....	13.96
Shoeing.....	113.60	Total.....	37,249.31

RECAPITULATION.

Road from—		State buildings.....	\$5,577.63
Habana to San Cristobal, first section.....	\$18,487.96	Road from Punta Prava to Cangrejas.....	2,600.00
Habana to Bejucal.....	33,795.48	Survey of the road from—	
Arroyo Apolo to Managua.....	14,907.00	Managua to Batabano.....	1,688.17
Habana to Guines—		San Antonio de los Banos to Guira de Melena and Alquizar.....	781.42
First section.....	7,203.63	General expenses.....	37,249.31
Second section.....	14,179.85	Total.....	144,256.96
Luyano to Gallega.....	8,186.51		





*Statement showing the work done on the roads named, province of Pinar del Rio, during the months from July, 1899, to February, 1900—Continued.*

## ROAD FROM GUANAJAY TO CABANAS.

Class of work.	Subdivision.	Number of days' wages.	Meters.		Unity of work per day's wages.	Total cost.	Price of unity.	Observations.
			Linear.	Square.	Cubic.			
Preservation .....	General expense .....	249				\$349.04		
	Opening of ditches .....	68			274	86.61	\$0.315	
	Grading of walks and cleaning of ditches .....	734		173,661		997.68	.0574	
	Crushing of stone .....	81			75	57.25	.763	
	Hauling of stone .....	56			96	78.10	.82	
	Purchase of stone .....				45.5	40.00	.89	
	Filling of holes in road .....	30		354		48.81	.054	
	Hauling dirt .....	14			91	26.76	.294	
	Total .....					1,684.25		

## SECOND SECTION OF ROAD FROM HABANA TO SAN CRISTOBAL.

Preservation .....	General expense .....	476				\$596.91		
	Opening of ditches .....	183			1,050	228.94	\$0.32	
	Grading of walks and cleaning of ditches .....	1,578		277,319		2,068.12	.007	
	Hauling of stone .....	100			458	102.84	.22	
	Crushing of stone .....				541	378.57	.69	
	Measuring of stone .....			968		53.40	.09	
	Filling holes in road .....	49			102.6	55.49	.057	
	Excavation of earth .....	26			356.5	20.29	.19	
	Hauling of dirt .....					89.14	.25	
	Quarrying of stone .....					2.77		
	Hardware .....	15			45	23.70		
	Obtaining supply of stone .....	241				18.14	.40	
	Spreading stone .....		1,000			241.97	.24	
	Sprinkling roadbed .....					18.90		
	Pumping and sprinkling of road .....	60				53.00		
	Arranging walks .....	8			48.75	6.09	.14	
	Hauling and spreading top dressing .....	9			33	10.00	.83	
	Rolling .....		625			81.04	.12	
	Hire of animals for rolling .....					207.37		
	Transportations of rails .....					6.00		
Chicharron, section house .....	General expense .....	4		10		14.54		
	Mending roof .....	6		24		5.60	.56	
	Plaster repairs .....	1			100	9.60	.40	
	Base walls .....	1				2.80	.280	
	Fixing well masonry .....					2.00		

Paving floor of porch.....	1	3	3	27.51	2.00	.66
Painting roof and doors.....	18	496	3	27.51	11.20	.022
General whitewashing.....	21	11.7	61.50	61.50	16.00	.014
Fixing entrance.....					.80	
Purchase of lime.....					3.60	
Cleaning of privies.....					18.00	
Hardware.....					6.93	
Whitewashing and painting.....					4.00	
General expense.....	13.5			13.5	71.62	
Making mortar.....	23.0		1	14.80	14.80	1.04
Ordinary mason work.....	68.0		.63	48.40	48.40	3.31
Mason helpers.....				54.40	54.40	
Purchase of lumber.....				257.91	257.91	
Hauling of lumber.....				21.82	21.82	
Carpenter work.....				249.26	249.26	
Purchase of lime.....				54.00	54.00	
Hauling of materials.....				42.18	42.18	
Hardware.....				82.66	82.66	
Plastering and paving.....				107.20	107.20	
Whitewashing.....	40.0	2,661	66.37	45.52	45.52	.17
Mending roof.....	1.0	10	10	.30	.30	.30
Opening of privy well.....	11.0		33.0	8.60	8.60	.26
Purchase of tiles.....				9.75	9.75	
Painting of doors.....	6.0	240	40	6.40	6.40	.002
Cleaning and washing floor.....	1.5			1.60	1.60	
Hauling of dirt.....	6.0		21.6	5.00	5.00	.23
Building entrance.....				4.50	4.50	
Making two chimneys.....				23.70	23.70	
Total.....				5,483.28		

By contract.

## THIRD SECTION OF ROAD FROM HABANA TO SAN CRISTOBAL.

Preservation.....	339	329,652	172.18	\$657.92	\$0.012	
General expense.....	1,915		3.22	4,116.13	.0318	
Grading of walks and cleaning of ditches.....	135		25.25	138.69	.055	
Hauling of stone.....	108	2,738	5	151.08	.276	
Filling of holes.....	3		19.5	4.15	1.18	
Opening of ditches.....	20		35	23.04	.27	
Crushing of stone.....	7			9.48		
Hauling dirt.....				12.60		
Hauling supplies.....				88.00		
Rent of house.....	12		48	16.00	.33	
Excavation of earth.....				45.25		
Hardware.....				3.36		
General expense.....				5.88		
Roof.....				27.02		
Putting house together.....				2.50		
Hauling of lumber.....						

Portable section house, kilometer 48.  
Chappotin section house, kilometer 54.

Portable section house, kilometer 61.

*Statement showing the work done on the roads named, province of Pinar del Rio, during the months from July, 1899, to February, 1900—Continued.*

THIRD SECTION OF ROAD FROM HABANA TO SAN CRISTOBAL—Continued.

Class of work.	Subdivision.	Number of days' wages.	Meters.			Unity of work per days' wages.	Total cost.	Price of unity.	Observations.
			Linear.	Square.	Cubic.				
Mangas section house, kilometer 67.	General expense.....						\$30.87		
	Putting in pump.....						12.25		
	Hardware.....						40.09		
	Purchase and hauling of lumber.....						263.95		
	Taking down section house.....						27.02		
Section house, kilometer 71.	Purchase of tiles.....						11.04		
	Purchase of lime.....						5.00		
	General expense.....						26.50		
	Purchase and hauling of lumber.....						20.92		
	Putting together and taking apart section house.						4.80		
Rio Hondo section house, kilometer 89.	Roof.....						51.41		
	Hardware.....						33.19		
	General expense.....						5.68		
	Putting on tiles.....						3.60		
	Hardware.....						33.19		
Pontoon, kilometer 70.....	Repair of railing.....						26.80		
Bayate bridge, kilometer 76.	Purchase and hauling of lumber.....						44.43		
Rio Hondo, kilometer 89.....	Cleaning bed of river.....						9.00		
Pontoon, kilometer 91.....	Mason work.....						17.33		
	Total.....						5,978.17		

## SUNDRY EXPENSES.

Reimbursement of expenses.....	\$1,608.39
Shoeing of animals and cure of same .....	29.67
<b>Total</b> .....	1,638.06

## RECAPITULATION.

Road from—	
Pinar del Rio to Coloma .....	\$4,057.16
Guanajay to Mariel .....	2,325.82
Guanajay to Cabanas .....	1,684.25
Habana to San Cristobal—	
Second section.....	5,501.28
Third section .....	5,978.17
Sundry expenses.....	1,638.06
<b>General total</b> .....	21,184.74

## APPENDIX J.

## REPORT.

## INTRODUCTION.

In compliance with article 25 of the regulations for the government of the department of public works, this report is written comprehensive of the class, quantity, and cost of the works and studies carried out in the province of Matanzas; also the services of inspection, direction, and management connected with same during the fiscal year 1899 to 1900.

The most peremptory necessities of the province are also herein stated in condensed form, and the convenience of starting, as soon as possible, certain works that will greatly advance agricultural interests, which are the only sources of wealth in the country.

This report is not as complete as would be desired, on account of the lack of works and studies during the first six months of the fiscal year, the works carried out having been of very limited importance, two small repair jobs—and a few conservation repairs to lighthouses and buoys.

The figures shown can not be considered as exact, but only approximate, on account of the lack of statistical data of sufficient guaranty.

## FIRST PART.

## WORKS AND STUDIES CARRIED OUT.

*Repairs of the road from Matanzas to Canasi.*—The repairing works of the road connecting Matanzas and Canasi, requested several times since the beginning of the last year by the said municipality, by the civil governor, and recommended by the military authority of the province, commenced to be studied and carried out almost simultaneously, i. e., the 2d day of January, 1900; certain examinations of said works having been made during the latter part of December preceding. The extension of these works in June reached 4 kilometers 446 meters, viz:

1,450 meters leveled with madacam foundation and steam rolled.
2,650 meters leveled with foundation and steam rolled.
346 meters leveled with foundation.

4,446

The 3 kilometers of the beginning of this road had different widths, between 12 and 17 meters, continuing afterwards with 5.80 meters, and for this reason the repair followed these latter dimensions, making said road of a medium width of 8 meters, increasing in this manner over 30 per cent the total cost of the work. The cost of same, excepting the expenses for inspection and management, amounts to \$38,496.49 (statement No. 1), and, including those expenses, to \$43,844.66 (statement No. 3), causing an increase of 13.9 per cent. The rates of salaries and wages paid, price of material employed, and different classifications of works appear in statements Nos. 4, 5, and 6. Copies of the plans and outlines of the works carried out are attached under statements Nos. 7 and 8.

*Studies of the road from Matanzas to Cidra.*—Studies of the road from Matanzas to Cidra were commenced the 28th of last May by order of the department, there having been examined, up to the 30th of June, 13 kilometers 784 meters, at a cost of \$1,512,

not including expenses for inspection and management (statement No. 1), and, including these expenses, to \$1,722.91 (statement No. 3), an increase of 13.9 per cent. Statements Nos. 4 and 6 show the figures paid for salaries and wages and the amount paid per kilometer. Copies of plan and outlines are also attached under Nos. 9 and 10.

*Stakes of Cardenas port.*—Cardenas port has 10 stakes, all made of iron, with chains; 8 of these are new and 2 repaired ones, having been made and placed by superior orders during the first six months of the last fiscal year; the cost of same amounts to \$2,888.33 (statement No. 1), exclusive of inspection and management, and to \$3,289.59, including these latter expenses (statement No. 1), an increase of 13.9 per cent.

*Dredging of Cardenas port.*—By order of the government the dredging of Cardenas port was carefully studied, after several requests of the municipality and recommendation of the captain of said port, commencing on the 1st of February and ending on the 20th of May. The area dredged (10 square kilometers) cost \$6,171.57 (statement No. 1), exclusive of inspection and management; including these latter expenses the whole amount reached \$7,028.96 (statement No. 3), an increase of 13.9 per cent. The rates for salaries and wages paid and the cost per square kilometer can be seen in the statements Nos. 4 and 6. The proper documents relating to the said project, containing four propositions, were submitted to the decision of the general direction. Said propositions were as follows: 1 channel at Cayo Buba, 22 feet deep, \$510,782.40; 1 channel at Cayo Buba, 25 feet deep, \$1,608,746; 1 channel at Cayo Diana, 22 feet deep, \$557,367; 1 channel at Cayo Diana, 25 feet deep, \$1,565,745.20.

*Repairs of Punta de Maya light-house.*—Punta de Maya light-house was repaired during the first six months. The iron tower was painted, the walls plastered and white-washed, doors and windows painted, rain pipes repaired, etc.; cost, \$62,763 (statement No. 1); including inspection and management, \$71,484, an increase of 13.9 per cent. The total amount invested in studies and works, including inspection and management, reaches the sum of \$56,600.96.

## SECOND PART.

### ESTIMATES FOR WORKS AND EXAMINATIONS DURING THE FISCAL YEAR 1900 TO 1901.

*Repairs of the road from Matanzas to Canasi.*—In consequence of inspections made and data acquired, 18 kilometers of road can be repaired during this year. The following is the estimate of cost per kilometer:

Leveling .....	\$1,000
Spreading of stone .....	3,600
Macadam .....	1,700
Steam rolling .....	300
Filling holes .....	300
Incidental expenses .....	250
Total .....	7,150

#### General estimate.

18 kilometers grading, spreading of stone, macadam, steam rolling, filling holes, 6 meters wide, at \$7,150 .....	\$128,700
1 wooden bridge over Yumuri River, kilometer No. 6, 20 meters span, with 4.50 meters height over the level of the flood .....	3,000
Another bridge of the same kind over Arroyo Dulce with same span, but higher, with approaches .....	5,000
Total .....	136,700

Referring to the credit necessary to finish this road, 7½ kilometers remaining to reach Canasi, it is estimated at about \$49,000.

*Construction of the road to connect Matanzas with Cidra.*—The detailed estimate for the works that are to be carried out in the construction of the road from Matanzas to Cidra has not been prepared yet; therefore, only an approximate idea can be given at the present time as to the cost of each of the two projects that will be shortly submitted to the government for approval.

#### Estimate for the project by way of El Cangrejo.

4 kilometers from La Jaiba to La Encrucijada, at \$7,000 .....	\$28,000
11 kilometers 400 meters from La Encrucijada to Cidra, at \$6,912.28 .....	78,800
Building at Arroyo La Vieja, including grading work .....	6,000
Total (15 kilometers 400 meters) .....	112,800

*Estimate for the project by way of Velis Melis.*

3 kilometers 500 meters from La Jaiba to La Encrucijada, at \$8,971.42.....	\$11,400
11 kilometers 400 meters from La Encrucijada to Cidra, at \$6,912.28 .....	78,800
Building at Arroyo La Vieja, including leveling work.....	6,000
Total (14 kilometers 900 meters) .....	116,200

*Study and construction of a road starting from the one that connects Matanzas with Cidra, and ending at Santa Ana.*—While this report was being written, orders were received from the department to study the construction of a road which, commencing from the road that connects Matanzas and Cidra, should end at Santa Ana. Now it can only be stated that the study will comprise an extension of 5 or 6 kilometers, at a cost of \$1,000, and the estimate for the work would be very near \$50,000.

## THIRD PART.

## BRIEF REPORT OF THE MOST IMPORTANT NECESSITIES OF THE PROVINCE.

This principal office understands, in consequence of the data obtained, that it would be very convenient to start the following public works:

*Roads.*

In the first place, the repair, or, better said, the complete building of the numerous roads that cross the province in all directions. The word "building" is used because they are in such a bad condition that hardly any traces of traffic can be seen on many of them, and on others only by the fences of the properties can it be supposed that said roads exist. Among these we will point out the following:

I. The central road of the island, that starts from this city at the junction of the streets San Luis and Esteban in the direction of Benavides, following up to Ceiba Mocha and penetrating farther on into the province of Habana. This road, at the distance of 282 meters from the point called La Jaiba, turns to the right and passes over the hill Velis Melis, where it connects with the road of La Cidra (that is actually being studied), continuing to La Encrucijada, it having a length of 3,502 meters. At this place it turns to the left, leaving the road of La Cidra, and goes in the direction of Guanabana, following on to Tumbadero, where it crosses the Canimar River, continuing toward Limonar, Sumidero, Carlos Rojas (formerly Cimarrones), Altamisal, Guamutas, and Motembo, penetrating into the province of Santa Clara.

II. The road from Matanzas to Cardenas, passing through Limonar and Coliseo. This road can be started from Matanzas in two different directions that will converge at the Tumbadero. The first direction would follow exactly the track of the central road of the island up to Tumbadero and continue to Coliseo. The second direction would start at Matanzas from the street named Terry, following that of Buriel, continuing to Tienda Nueva over the hill named Folch toward Tumbadero, then on to Coliseo, where, turning to the left and crossing the limits of the plantations Santa Amalia, Maria, Tailor, San Francisco, and others, reaches the Esquina de Tejas, and continuing over the Phiney hill goes into Cardenas by the main road.

III. Another road from Matanzas to Cardenas, starting from the first city by the course described in the preceding paragraph, up to Gelpi, passing over the road now existing between the plantations Union Desada and Monticelli, reaching the Canimar River at the place named El Andarivel (where this river is very wide, a rope ferry being used to cross it), continuing by Camarioca to Cardenas, entering this latter city by the highway named O'Donnell.

IV. Road from Matanzas to Alacranes. This road could be constructed as a continuation of the road that connects La Cidra with Santa Ana, following La Bija, Cabeza, Vieja Bermeja, and Alacranes, continuing up to the plantation Conchita, crossing a large agricultural zone. It would be about 55 kilometers long.

V. Road to connect Sabanilla with the districts of La Palma and Rio de Auras; length, 14 kilometers.

VI. Road from Guamacaro to Limonar; 14 kilometers long.

VII. Road from Colon to Banaguises; 8 kilometers long.

VIII. Road from Colon to Sabanilla de Guareiras; 10 kilometers long.

IX. Road from Colon to Limpio and plantation Carrillo; 5 kilometers long.

X. Road from Colon to Retamal; 10 kilometers long.

XI. Road from Colon to Rio Piedras and Macagua; 20 kilometers long.

XII. Los Arabos road which passes through La Macagua ends at the bridge of the plantation Sociedad. It is 5 kilometers in length.

XIII. Road from Matanzas to Canasi, with an average length of 30 kilometers. A part of this road is being constructed now and the continuation is being studied.

Besides these roads described, there are many others of less importance which can not be mentioned in this report on account of lack of data referring to same.

*Drainage and sanitary improvements.*

The lands of El Roque and those of San Anton de la Anegada in the Recreo are very liable to be overflowed, which renders useless a large extension of territory appropriate for all kinds of cultivation. It is believed that the inundations of both said districts are due to subterranean connection, which causes an overflow on the surface of the land. Many years ago a channel was made to drain these lands. This channel starts at the Oxamendi lakes, ending at river Anton. This channel, the same as the river Anton, is at the present time absolutely useless for drainage purposes, inasmuch as both are completely obstructed with weeds and all kinds of plants and trees that prevent the waters from running. The said channel should be cleaned, the same as the river, so as to help and relieve the present condition of those lands. A very careful study of these lands is necessary to put them in good condition. The large extension of same will take some time to carry them out and will make them very expensive. Twelve thousand dollars may not be sufficient to cover the same. A commission should be appointed to this effect, charged with the gathering of all the data and different studies made of the matter in former years.

*Port improvements.*

It is convenient to carry out the following port improvements: At the city of Matanzas, the construction of wharves at the anchoring ground at Dubrocor near it or the Matanzas railroad. This project would be improved by blowing up the shoal La Laja, existing near this place. The said anchoring ground has sufficient depth to admit the largest vessels, occupying the most protected part of the bay against heavy seas and storms. Studies referring to these works are being carried out by the department of military engineers of Matanzas and Santa Clara. A careful and complete study referring to the dredging of the entrance of Cardenas port and the estimate for same have been carried out by the bureau of studies of this office. The reconstruction of the government wharfs, now destroyed, would prove to be a great advantage, furnishing large incomes.

*Bridges.*

All the bridges of this province are in bad condition, some are almost destroyed, others should be rebuilt, all are in need of repairs, and other new ones should be built. The following ones are considered to be the most necessary: One bridge to cross the river San Andres, with a span of 10 meters, on the road from Alacranes to the plantation Conchita; 1 bridge at Zapato Pass over La Palma River; 3 bridges, named Delgado, Ciego, and Arroyo Manteca, in the district of San Jose de los Ramos; 4 bridges: 2 over river La Palma, 1 over river Zuaznavar, 1 over Arroyo Caballo Seco, on different roads in Macagua district; 1 bridge over river Guareiras, or Palmillas, on the road from this latter town to Manguito, at the place known as Los Aburridos; 1 bridge over river La Luz, at the place called Tinima, in the district of Cumanayagua de Palmillas; 1 bridge over the Arroyo Conclusion, in the district of Jacan de Palmillas.

*Summary.*

This principal office understands that the following order is to be observed when carrying out public works in this province.

I. Finishing the highroad from Matanzas to Canasi.

II. To commence at once the works at the highroad connecting this city with La Cidra and Santa Ana, which is being studied at the present time, requesting from the Government the necessary credit for this work. Until the Department decides the project which is to be adopted it is not possible to state the exact amount necessary for this work. It can be stated that \$162,000 is approximately the amount required. If these works are commenced without delay it is probable that the road can be finished during this present fiscal year.

III. Road from Matanzas to Cardenas, adopting the second project described in the second paragraph of the chapter on roads, namely, starting from Matanzas, by way of Burriel street, toward and over Folch hill up to Tienda Nueva and Pilar de Ona, as far as Tumbadero, where it crosses Canimar River, continuing by way of Limonar and Suminero as far as Coliseo, following the outskirts of various plantations up to



La Esquina de Tejas, passing over Phiney hill and entering Cardenas by the main road. The convenience of following the project described is hereby recommended, on account of its being very much shorter and of passing through an extensive district at present unprovided with transportation facilities and furnishing means of bringing agricultural products to the Playa and Pueblo Nuevo ward. The total length of this road from Matanzas to Cardenas will reach about 59 kilometers.

Referring to the other project described in the third paragraph of the same chapter, it, although being a little shorter, offers the great disadvantage of passing through a very poor district. The properties situated between Camarioca and Cardenas having their market in this latter city would not receive any advantage with the construction of this road; besides, a very expensive work would be necessary to replace the rope ferry now used for the transportation of people, animals, and freight. The road here recommended would prove a great advantage to the town of Mendez Capote (formerly Lagunillas), now destroyed. A branch road starting at the place named Esquina de Tejas, only 2 kilometers long, would connect the above-mentioned town with the city of Cardenas. This has been requested many times by the people of that district. The length of the road from Cardenas to Coliseo would be about 19 kilometers, 39 kilometers from Coliseo to Matanzas, and 58 kilometers between Cardenas and Matanzas. There are many valuable properties between Cardenas and Coliseo. The central sugar plantations, Dolores and Buena Vista, now destroyed, would be rebuilt as soon as the communications are renewed. Near Coliseo there are many properties devoted to the raising of sugar cane which have a first-class quality of soil suitable for all kinds of cultivation. The central sugar plantations, Carolina and Santa Amalia, are also worthy to be mentioned here. The said road also would establish communication with the bathing resort called San Miguel, near the stations Sumidero and Coliseo, district of Limonar. These baths are the best ones in the province, and maybe in the island; they are said to excel those of San Diego and Madruga, of well known reputation. The study of this road may cost about \$4,000 and the work about \$280,000; these two figures are only approximate.

IV. It would be very convenient afterwards to extend up to Carlos Rojas (formerly Cimarrones) the camino central (central road), which has been described in the first paragraph of the chapter on roads (caminos). If the department accepts the suggestion of this principal office following the described project, it will only be required to extend the road to build a branch road from Encrucijada to Guanabacoa, from this place to Tumbadero, where it joins with the one that leads to Cardenas, continuing up to Coliseo, where they will divide again to find the camino central (central road) to Carlos Rojas, crossing this town by main street called Marti (formerly Real), which is in need of immediate repairs. The first portion of the road from Encrucijada to Tumbadero may be about 16 kilometers, and that from Coliseo to Carlos Rojas about 14 kilometers. Therefore, only 30 kilometers are to be constructed to extend the road up to Carlos Rojas. The approximate cost of both studies would be about \$3,000; that of the works \$140,000, also approximate.

V. Road from Cardenas to Camarioca. This road starts from Cardenas at O'Donnell street by the way of the cemetery situated about 2 kilometers from that city, following up to the place called Cuatro Caminos, near the plantation Precioso. This principal office understands that the road should end there at Cuatro Caminos, 8 kilometers from Cardenas, crossing a very valuable extension; over 300 caballerias of very fertile soil belonging in great part to the sugar plantations Precioso and La Rosa, that will manufacture in the coming year about 50,000 sacks of sugar. In the surroundings several farms devoted to different cultivations are found. All of them carry and sell their products at Cardenas market. The properties between Cuatro Caminos and Camarioca are of very little value; to continue the road up to the latter place it is necessary to build a bridge of 20 meters span. This office would not recommend at the present time to make such large expenses, the agricultural interests are so very poor in this part of the country. The study of said road may cost \$900 and the work about \$26,000, figuring this low price because the stone is very abundant there and it is believed this material can be obtained at a very low price. Also some help may be obtained from the neighbors.

VI. The road from Colon to Banaguises, 8 kilometers long, passes near very valuable properties—plantations La Luisa, of the heirs of Armas; Conchita, of Serafin Mederos; Flor de Cuba, Marquesita, and others; also the central sugar plantations San Fernando and Alava of Mr. Mendoza and heirs of Zuelueta, respectively. This road is in a very bad condition, and the lack of stone in the surroundings will make the repair very expensive. Eight small bridges, 1 pontoon of 4 meters, and 1 bridge of 8 meters are to be constructed, and the bridge now existing near the reservoir of the plantation Ponina is to be repaired. Studies for these works may cost about \$1,800 and the construction of same not less than \$85,000.

VII. The road from Matanzas to Alacranes has been already described by paragraph

4, chapter on roads (Caminos), and should start from Santa Ana by way of La Magdalena up to the plantation Conchita with an extension of 45 kilometers. The studies may cost about \$4,000 and the works about \$200,000. This road crosses a very fertile district, and the many valuable properties existing in the surroundings will certainly improve their present conditions as soon as the communications will be restored.

VIII. This office hereby recommends the immediate dredging of one of the entrances of Cardenas port. The studies for this work have already been completed and the estimates and report referring to same have been submitted to the general direction of public works, suggesting that the less expensive manner of carrying out this work would be to reduce the depth and width of the projected channel.

#### RAILROAD INSPECTION.

In consequence of the examinations carried out through the railroads of the province (railroad of Cardenas and Jucaro and railroad of Matanzas) the following statement is to be made:

Notwithstanding the ruinous condition in which the island has been placed after the past war, producing a large reduction in all the railroad incomes, the above-mentioned ones—Cardenas and Jucaro and Matanzas—are not in so bad conditions, due to the continuous efforts made by the directors and managers in the reconstruction of all the damages caused by the effects of the war. It is to be noted here that if the said parties continue, as up to the present time, repairing the tracks, rebuilding the stations, repairing bridges, and improving the rolling stock, it is possible that at the end of this year or at the beginning of the next one these railroads will be replaced in the same good condition of prosperity they enjoyed before the war.

This office hereby begs to call the attention of the department to the lack of regulations referring to the attributions, duties, and manner of carrying out, as far as possible, the inspection ordered; also as to the necessity of increasing the number of inferior employees to aid this office to carry out the inspection, because at the present time it is absolutely impossible to fulfill this duty with the short number of clerks attached to this office.

The mentioned railroads reach a total length of 600 or more kilometers, which inspection corresponds to this office; and including the different branches of private service, most of them belonging to the railroads to which they connect, the whole extension to be inspected reaches very near 900 kilometers.

In consequence of the statement made in the preceding paragraph, if the department does not agree to furnish this office with the small number of inferior employees requested to attend to the inspection, this service will continue to be nominal, as happened during the preceding régime, when only attention was paid to the concession of permits for extending new branches when requested by the managers of said railroads, and in cases of unfortunate accidents that could have been avoided or prevented by having a good and true inspection.

It also can happen that, due to the small number of inferior employees attached to this office, the chief engineer could not attend to an accident reported, for being absent fulfilling some other duties of the department, and not having employees to substitute him in these cases, it will happen that, on account of noninspection, the real causes of said accident, and the responsibility of the persons at fault for the damages produced, will remain uninvestigable.

COSME DE LA TORRIENTE, *Chief Engineer.*

MATANZAS, July 23, 1900.

#### DESCRIPTIVE REPORT OF THE STUDY OF THE ROAD FROM MATANZAS TO CIDRA AND SANTA ANA.

##### UTILITY AND NECESSITY OF THE WORK.

The purpose of this study is to furnish an easy means of communication between the city of Matanzas and the towns of Cidra and Santa Ana, for the purpose of transporting to Matanzas the products of so rich a district; on the one hand the sugars from the five central factories—San Cayetano, Triunvirato, Jesus Maria, San Lorenzo, and Los Angeles—and on the other the minor products of the rich valleys of Santa Ana and Magdalena and adjoining lands, the present cost of transportation to the city of the same being in excess of their market value. For example, at the present time the transportation of a bag of sugar from the plantation to the Cidra station on

the Sabanilla Railroad is from 15 to 20 cents, which, together with the 45 cents that the railroad company charges for freight to Matanzas, makes a total of from 60 to 65 cents, instead of from 25 to 30 cents that it would cost to transport it over a good turnpike. Hence the great necessity of the projected work and the advantage that it will give to Matanzas and to all the district through which it passes.

#### LENGTH OF THE PROJECTED ROAD.

The road which it is projected to change into a turnpike starts from the corner of the Esteban and Belis Melis roads at a point known as the Jaiba, leading first to the southeast as far as the Belis Melis hill, and then to the southwest for a distance of 3,500 meters, to the place known as the Encrucijada, the place of intersection of the roads—one leading east to Guanabana, another to the northwest to the San Juan River and Seiba Mocha, and the projected one that continues to the south as far as the town of Cidra. At kilometer 6 (station 3500) there is left to the right the Palmas road, which, in a southwesterly direction, leads to the old town of Santa Ana along the boundaries of the Aldazabal and Los Angeles properties. This road was examined and rejected, due to its rocky and hilly condition, which would require at least nine extensive fillings and many excavations. At kilometer 7.500 (at Los Congos hill) it again crosses the public road, one branch of which leads to the northeast to Guanabana; another, which is a byroad, to the east southeast as far as the building inclosure of the sugar plantation San Cayetano, and finally to the south, continuing as far as Cidra. At 9,190 meters from the starting point the only important water course on the road study is crossed—La Vieja Creek—on the borders of which was the old town of the same name. From Villain (kilometers 11.500) two branches are projected, the principal one leading in a south-southeast direction through the plantations Los Angeles and Triunvirato as far as the Cuatro Caminos of Sabanilla or Lapargo (kilometers 14.100), where it meets the Cidra turnpike that leads to the end of the present projected road recommended (kilometers 14.900). Later on it should be prolonged to Sabanilla, Alacranes, and Bolondron, etc., and thus cross the province from north to south. The other branch turns to the right, or, that is, to west-southwest, also passing through the sugar plantation Los Angeles as far as its present termination at the abandoned town of Santa Ana, the branch having a length of 4,950 meters. It is projected later on to extend this branch to Magdalena, Cabezas, etc., penetrating into the province of Habana and connecting with the Guines turnpike.

#### EXTENT OF THE STUDY.

The orders from the superior authorities, as well as the desire to improve as far as possible the present surveys, harmonizing the interests of the government with those of the owners of adjoining properties, have rendered it necessary to run sundry lines with the instrument, having the length expressed as follows, the total of which amounts to 40,500 meters:

	Meters.
Belis Melis survey:	
Present road to Cidra .....	14,900
Straightening curve at Belis Melis hill .....	1,600
Straightening curve at La Vieja Creek .....	500
Straightening curve at kilometer 12 .....	1,650
Straightening from kilometer 12 San Cayetano to Cidra .....	4,100
Cangrejo survey:	
Present road to Encrucijada .....	4,000
Straightening curve at Jesus Maria hill .....	350
Santa Ana survey:	
Present road from Villain to Santa Ana .....	4,645
Straightening curves at kilometers 2 and 3 .....	1,665
Survey from Cidra to Santa Ana, by way of Lapargo:	
Present road .....	4,700
Straightening curves .....	530
Straightening at boundaries of Triunvirato and Lapargo .....	1,860
Total .....	40,500

#### DESCRIPTION OF THE ROUTES.

In view of the number of different surveys that have been made, the extent of this work and the diversity of conditions of each section, for greater clearness it has been preferred to describe the work in sections of about 4 kilometers, separately stating the advantages of each section, and adjusting the partial estimates to the conditions of their corresponding districts.

## CANGREJO SURVEY.

This route commences at the intersection of the Belis Melis and Esteban roads, at a point known as the Jaiba, and is divided into three parts:

First, from the Jaiba to Cangrejo to the southwest over 1,400 meters of the road to Seiba Mocha with a medium grade of 4 per cent. Its grading is virtually done, its repair will cost very little, and it would be of effective service to the present traffic between Seiba Mocha and Matanzas.

Second, from Cangrejo to the south until meeting the road from Guanabana to Seiba Mocha, a distance of 1,700 meters. This section presents the great difficulty of having an average grade of 11 per cent in 280 meters, reaching a maximum of 15 per cent, immediately followed by a kilometer of 3 per cent average grade, which prevents animals from having the necessary rest after ascending such a deep incline. Nevertheless it must be taken into account that the greatest traffic in weight would be in a descending direction, from its generally consisting of produce that the central sugar factories and smaller properties would send to the Matanzas market, and therefore practically the said difficulty would not be of such great importance. The steep grades of 11 and 14 per cent may be lessened to 7 per cent if authorized by the director-general's office, utilizing for the purpose a hollow that exists to the west of the present road. This improvement is detailed in a separate plan; it is 340 meters long, and its grading would cost \$12,000.

Third, from the aforesaid point of meeting toward the southeast over the road from Seiba Mocha to Guanabana as far as Encrucijada. This branch, which is 900 meters long, has a grade of only 3 per cent, a width of 12 meters, and the roadbed has only to be raised for the purpose of facilitating drainage.

## ESTIMATE.

On preparing the prices per unity for the different plans of work in each partial estimate, there have been considered not only the average class of material and transportation, but also the advantage of economically utilizing in certain cases the excavated material, for which reason there will be observed the differences in the prices fixed per unity, even in the same kind of work. As to building work, lump sums are given in these estimates, which will be fully detailed when final proposals are advertised for. The Cangrejo route traverses hard limestone lands, which in some places degenerate into decomposed serpentine. There being stone in abundance, it is proposed to utilize excavated materials for the stone fillings, a method which has been generally adopted in the other studies whenever the measure offers economical advantages. The inclosed estimate of the Cangrejo route amounts to \$36,448 American gold, the linear meter of finished road costing, in accordance with improved plans, \$9,067 American gold, which high price is due to the heavy cut already mentioned. In recapitulation, the Cangrejo route, as compared with the present road of Belis Melis, offers the following advantages: (1) By having two sections, with 2,300 meters already graded, with very light grades, which at the same time form part of public roads already existing which connect Seiba Mocha with Matanzas and Guanabana; (2) less hardness of the stone and consequently easier work; (3) the greater amount of traffic and the value of the products and of adjoining properties. In exchange its disadvantages are: (1) The heavy grades of the second section; (2) its greater length by 500 meters; (3) the cost of the grading of the aforesaid section; (4) the greater total cost of road as far as Encrucijada.

## GENERAL SURVEY OF BELIS MELIS ROUTE.

This route comprises four sections: (1) From Jaiba to Encrucijada; (2) from Encrucijada to Los Congos hill; (3) from Los Congos hill to Villian; (4) from Villian to Cidra.

## FIRST SECTION, FROM JAIBA TO ENCRUCIJADA.

This route in turn has required two surveys: (1) Over the present public road. The present public road is 3,500 meters in length, fully 12 meters wide, having stone fences in good condition along its entire length. The grades are generally easy, excepting at the Belis Melis hill, where the present survey, in the form of a double zigzag, climbs 52 meters of height in a distance of 800 meters, introducing grades of 6.50 and 7 per cent. In the accompanying outline the grade of 7 per cent has been established in the length of 750 meters. This grade is not only within the limits

allowed, but it must also be taken into consideration that it is attended by the most favorable conditions as regards amount and direction of traffic passing over it. The loads that will have to be hauled over this road to the extent of 80 per cent will consist of sugars and minor products that have to be sent from plantations and other properties to Matanzas, either for foreign shipment or local consumption, and to that of 20 per cent of merchandise from the city to the said plantations and properties, hence the aforesaid grade of 7 per cent for a short distance is deemed acceptable, much more so when it prevents all acts of expropriation, and its estimate, which is herewith sent, is evidently the most economical of all the studied routes to connect Jaiba with Encrucijada. When once the hill is passed there is an extended tableland of easy grade that offers the desired rest to horses, and the repair of which would be very economical. Two drains of meters  $.75 \times .75$  in connection with sundry transverse ditches would furnish means of drainage. In this section it has been deemed preferable to raise the roadbeds, for three reasons: (1) To improve the drainage; (2) to avoid the excavation of the very hard stone existing, and (3) to utilize the surplus stone from excavations in fillings and Telford base. The estimate of the said section amounts to the sum of \$30,788, American gold, giving as a price of the linear meter of finished road that of \$8,797, which is less than the Cangrejo route. The advantages of this route over that of Cangrejo are: (1) Its being shorter by 520 meters; (2) its being wider throughout its entire length; (3) the extent of its maximum grades, although greater, are followed by a flat table-land; (4) no expropriation acts having to be done; (5) its cost is less by \$5,660. It offers, nevertheless, the following disadvantages: (1) The greater length of its maximum grade; (2) the difficult draining of the high flat land; (3) its meeting of only one requirement, and this through cattle farms and sterile lands in the greater part, and (4) the extreme hardness of the rock and the difficulty of making cuts.

(2) NEW ROUTE FROM BELIS MELIS AND JAIBA TO ENCRUCIJADA.

This route differs from the preceding one only at the ascent of the Belis Melis hill, where it is projected to commence a new road with 4 per cent grade, starting from station 580 at the height of 12 meters above sea level, leaving the present road at station 780 at the height of 20 meters, and ascend the side hill in a double and wider zigzag to the height of 60 meters, where it is decreased to 3 per cent until it meets again the public road at station 1,580, the height of which is 67 meters above sea level. The length of this new piece is 200 meters over the existing road, and 1,233 in the adjoining properties. It is proposed to cut the road into the side hill to avoid the cost of building expensive walls. The excellent excavated material should be used for fillings and for the Telford base required for the work, and hence on fixing the prices of this class of work allowance is only made for the transportation, loading, and unloading of the said material. The width has been fixed at 7.5 meters for the road cutting in the side hill, it being considered sufficient for the roadbed, inside ditch, and bed for the railing outside. The estimate of the first section with the new stretch, exclusive of expropriation costs, amounts to the sum of \$41,927.50, which, applied to the 3,933 meters which it has in length, gives \$10.66 as the price of each linear meter of finished road. We will conclude by giving the following comparison of the sections in which the survey varies:

	Maximum grade.	Length.	Cost per kilometer.	Total cost.
	<i>Per cent.</i>	<i>Meters.</i>		
By present road.....	7	1,000	\$13,216.50	\$13,216.50
By new ascent.....	4	1,433	16,966.50	24,356.00

This new ascent, compared with the project of the repair of the present road and taking into consideration the reasons set forth on speaking of the former, the undersigned believes that the advantages, undoubtedly clear, which the existing road offers from its being shorter, more easily built, from not demanding new expropriations and its first cost of repair being less, would be more than compensated by the immense relief that traffic would receive by the reduction of the 7 per cent grades that it has to 4 per cent, the maximum established for the new ascent and by the great economy that would result in the annual expenses for its preservation, a very important point to have in consideration on making a final choice.

As to the apparent obstacle offered by the 7 per cent grade, I deem it proper to call attention respectfully here to the data contained in the report of the Department

of Santiago de Cuba for the year 1899, signed by Lieutenant Hanna, U. S. A. In the said report it appears that in the road built from the city of Santiago to San Luis, in its hilly part, the average grade is 3.50 per cent with a maximum of 12 per cent; hence that of 7 per cent is considered justified, which is fixed in the general survey.

#### SECOND SECTION, FROM BELIS MELIS TO CIDRA.

This section from the Encrucijada to Los Congos hill measures 4,000 meters in length by 12 wide. The maximum grade is 1.1 per cent and drainage relatively easy by means of sundry lateral ditches. The subsoil is of lime rock of moderate hardness and the material for gradings is good and easily obtained. The adjoining properties are better cultivated than those of the first section, notwithstanding the fact that one-third of them consists of breeding farms. Quarry supplies are good and may be had cheap. In conformity with what has been previously stated concerning level sections on the route, it has been decided to raise the roadbeds and employ Telford macadam to improve the drainage and avoid excavations. The estimate of the second section amounts to \$23,248.50 American gold, which, distributed over the 4,000 meters of its length, gives \$5,812 as the price of a linear meter of finished road.

#### THIRD SECTION, BY BELIS MELIS TO CIDRA.

From Los Congos hill, kilometers 7,500, to Vilian, kilometers 11,000, the third section of the projected road extends, crossing at station 9180 La Vieja creek, where it is projected to build a bridge of 12 meters span by 2.50 high, which will be sufficient to allow the passage of the greatest amount of water that might be carried by the creek. This section has a short reach with a grade of 7 per cent just before coming to the Vieja Creek, which will be rectified in the final project by its being reduced to 5 per cent. The average grade is not over 2 per cent. This section is naturally drained by the mentioned creek, but in addition sundry natural drains are projected. From Los Congos hill to the creek the base is moderately hard limestone, but after passing the latter the stratum is very hard, transversely to the axis of the road, for which reason it is proposed to fill in this section in the interests of economy. Within this section the cane fields of Morales, Los Angeles, Santa Elena, and San Cayetano commence, more than one-half of the land being in a state of perfect cultivation. In the estimate of the section of which we are treating it will be noted that while prices per unity decrease for excavation from the material being less firm, the amounts for large stones have relatively increased from the fact that those obtained from excavations are deemed deficient in size and quality. However, there are good quarries within a short distance that may be utilized without any increase in the price of hauling over that which is now given. The estimated amount of the cost of the work of the third section amounts to \$24,971 American gold, or \$7,134 American gold for each linear meter of finished road.

#### FOURTH SECTION, BY BELIS MELIS TO CIDRA.

The last section of the road commences at Villian (station 11000) in soft, stony ground, turning to the right of the old road to avoid the steep hills of Medina that intercept the public road at 12 kilometers, and to avoid the existing grades of 10 and 14 per cent, or otherwise make long cuttings of more than 4 meters deep, together with heavy gradings and fillings of 8 meters. This new course is 1,400 meters long, against 1,180 of the old one, the small increase in length being more than compensated by the easy grades and less cost of the projected new route. The excavations in this section are in varied kinds of earth, loose rock, decomposed serpentine, clay, and in some places swamps; hence the prices for excavation of compact earth appear high. For the somewhat difficult drainage of this section sundry sections of roadbed have been raised and fillings provided for that are explained in the inclosed estimate. The entire district has fine growths of cane belonging to San Cayetano, Triunvirato, San Lorenzo, Lapargo, and Los Angeles. This section furnishes excellent material for base and fillings, but in exchange it has no hard stone; hence the reduction in the price of earth gradings and increase in those of stone, due to the average increase of 2 kilometers haul. The cost of the works of the fourth section amount to \$28,391.50, American gold, which, distributed over the 4,140 meters of length that it has, gives as the cost of a linear meter \$6,851.

## BRANCH TO SANTA ANA.

The geological and topographical conditions of this section are so similar to those of the last section to Cidra that it is deemed unnecessary to describe them, the statement being limited to reporting that the projected road crosses the Morales, Los Angeles, and San Pedro creeks; avoiding three others between stations 1680 and 2260 by a new route through high and firm ground, the greater length of which is more than compensated by other apparent advantages. The distance from Villian to Santa Ana is 4,950 meters by the new route, the adjoining properties being under cane cultivation, belonging to the plantations already mentioned, and besides to those of Jesus Maria and San Ignacio, the building inclosure of the first being less than 1 kilometer distant from the end of the projected road. This section needs sundry works of filling in, as may be seen in the estimate, the prices of which have been adjusted to local conditions. The cost of the repair to the branch to Santa Ana amounts to \$35,025, American gold, the linear meter costing \$7,077.

## GENERAL ESTIMATES.

In recapitulation, we have the following general estimates for the selection that the superior authorities may make between the different routes presented between Jaiba and Enerucijada:

From Matanzas to Cidra.	Length.	Cost.
	<i>Kilometers.</i>	
By the present road of Belis Melis.....	15, 140	\$107, 399. 00
By the new route of Belis Melis.....	15, 573	118, 538. 50
By the Cangrejo road.....	15, 660	113, 059. 00
And adding each one to estimate of the branch to Santa Ana.....	4, 950	35, 029. 00
The following general totals are arrived at:		
By the present road.....	20, 090	142, 428. 00
By the new route.....	20, 523	153, 567. 50
By the Cangrejo road.....	20, 610	148, 088. 00

This report is accompanied by estimates, plans, and general outlines of each one of the described sections, and besides by the plan and outline of the road studied (but thrown aside) that connects Santa Ana and Cidra, through lands of the Lapargo plantation, should it be needed at some future time.

MIGUEL PALMER,  
*Engineer in Charge.*

MATANZAS, October 9, 1900.  
Examined and approved.

D. LOMBILLO CLARK, *the Chief Engineer.*

## STUDY FOR THE DREDGING OF THE ENTRANCE TO THE PORT OF CARDENAS.

## IMPORTANCE AND NECESSITY OF THE WORK.

The port of Cardenas, second in importance of Cuba, is the principal port of exportation for the product of the richest sugar district of the island, the exportation amounting annually to more than 180,000 tons. The present condition of the entrances to the said bay require that the said products, as well as all other merchandise there received, be placed in lighters two or three times before their final delivery to the outgoing steamers or on the wharves, paying a lighterage of \$1.50 per ton, this sole charge amounting to more than \$350,000 per annum. This work has for its object the removal of the evil by reducing considerably the cost of lighterage through the opening of a safe navigable canal for vessels drawing from 22 to 25 feet, extending from Stone Key on the north to La Poza, the latter being a large inlet having 30 feet of water, situated  $4\frac{1}{2}$  miles farther inland than the present anchorage of vessels of deep draft that engage in commerce with Cardenas, and is furthermore protected by the Hicacos Peninsula, which fact allows the operation of loading and discharging to be done on days in which the heavy sea or high wind would prevent the same being done at Stone Key. Besides, in the said inlet later on it might be considered of

public benefit to build piers and warehouses in combination with the extending of a branch of the Cardenas and Jucaro Railroad, whereby the planter would be furnished with direct transportation of his crop from the central factory to the steamer.

#### WORK EMBRACED BY THE STUDY.

The port of Cardenas has three natural entrances, which are: (1) The Hicacos Channel, to the north of the peninsula of that name, which, according to Pichardo's plan, inclosed herewith, has 24 feet of water, but which at the present time is only used by vessels of light draft; (2) the channel between Monito Key and Stone Key of the north, in which there are places having 40 feet of water, but avoided by mariners, owing to its narrowness and the serious danger arising from the periodical submerging at high tides of Monito Key; (3) the principal channel between Stone Key of the north and Mono Grande Key, of more than 1 mile in width, a channel which is always open with more than 27 feet of water as far as the northern limits of this study, or that is, for a distance of 5 miles in a course from south to south-southeast. The study embraces the principal channel in this last-mentioned distance, as well as both its windward and leeward branches, extending southward for 19,500 feet to beyond Diana and Buba keys, where it meets the aforesaid Poza Inlet, where there are places having 32 feet of water, protected from hurricanes, and therefore appropriate for anchorage of vessels drawing more than 20 feet.

#### TRIANGULATION.

The base line, measuring 1,467.47 feet, was established at Buba Key and the primary triangulation was extended so as to embrace the five stations utilized and which are designated in the plans with letters A, B, C, D, and E. For stations A and C it was necessary to build platforms 5 feet square and from 25 to 30 feet high in 15 feet of water, their high cost being due to the heavy seas and high winds that prevailed in January.

#### SOUNDINGS.

The soundings to the number of 9,000 were taken at a distance of 50 feet apart transversely, and the direction of the channels noted with greatest exactness. The depths noted caused the belief that all the present buoys are not properly located, and it is deemed proper to call the attention of the board of light-houses and buoys to the fact. All soundings have been reduced to conform to the mean tides that prevailed during the time of the study, and a registered record established or marked on the wharf piles at Cayo Diana for future reference. I deem it opportune to state that the tide at Cardenas fluctuates between 0.80 and 1.75. A plan is herewith sent giving the variation of the tides taken during the observations of the month of March.

#### OBSERVATIONS OF CURRENTS.

The currents were as thoroughly studied as was permitted by the changes of the sea, wind, and tide. The highest velocities noted at the different sections during the study were as follows:

[Miles per hour.]

Channel.	Running in.	Running out.
Channel from Hicacos to Chalupa .....	1.36	1.40
Channel from Stone Key of the North between the sections LL and N .....	1.15	1.30
Spaces between the sections H and LL .....	1.05	1.90
Channel from Buba, sections E and H .....	1.50	1.95
Channel from Buba, sections A and E .....	1.80	0.95
Over the shoal, sections E and H .....	1.05	1
Diana channel .....	1.20	0.90
Diana channel, sections A and E .....	1	

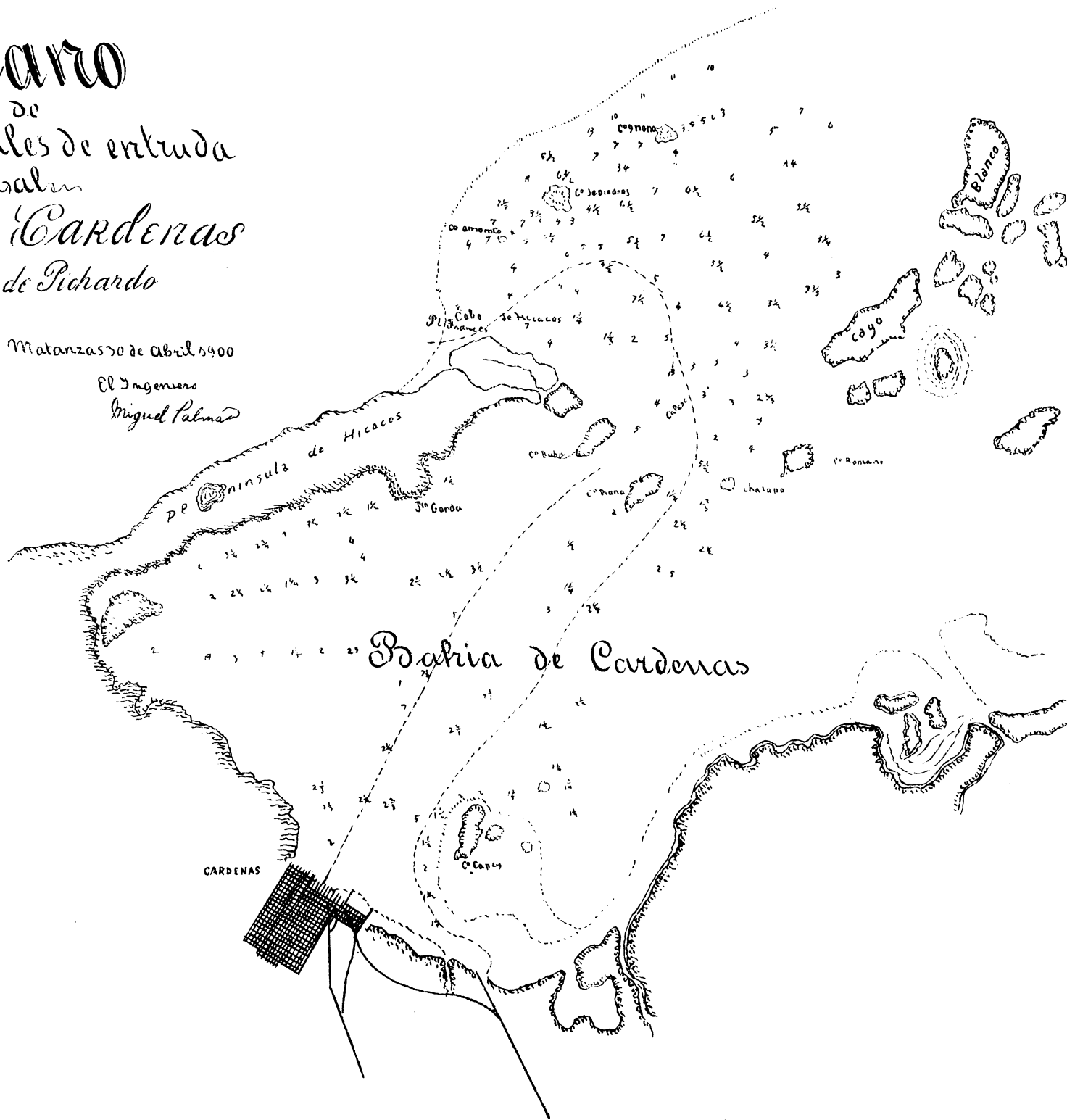
From these figures it will be seen that the strongest current is found in the Buba channel, a circumstance very favorable for its preservation in a state of cleanliness after it has once been dredged.



Plarro  
 de  
 Los Curules de entrada  
 valm  
 Puerto de Cardenas  
 Adaptado de Richardo

Matanzas 30 de Abril 1900

El Ingeniero  
Miguel Palma

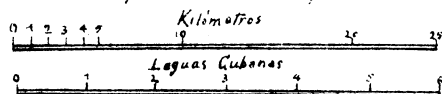




# *Plano de la Provincia de Matanzas* *Mostrando el Camino de Matanzas a la Cidra*

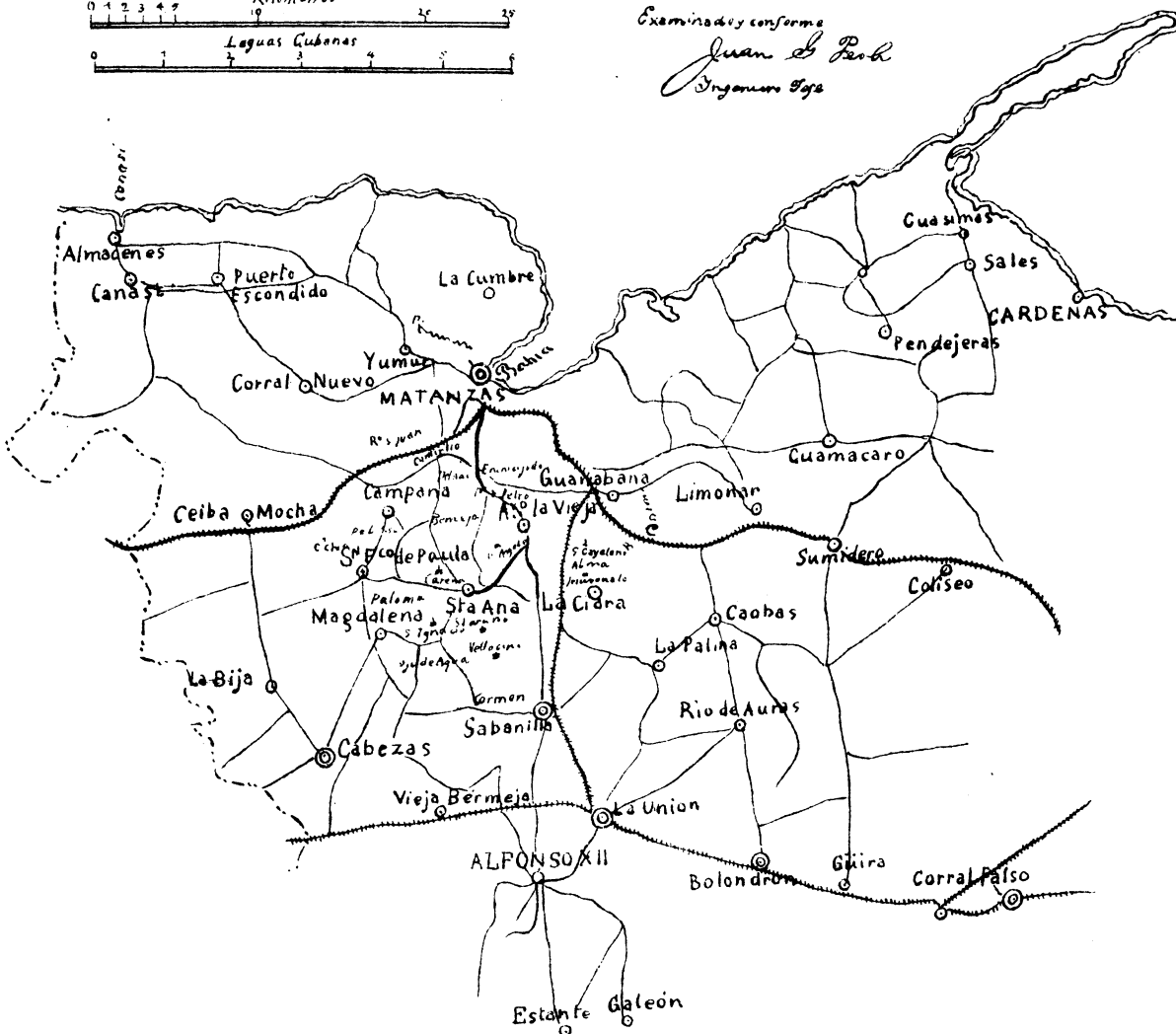
*Matanzas Agosto 31 de 1900 - Ingeniero encargado*  
*Miguel C. Palmer*

*Escala aproximada 1:450,000*



*Examinado y conforme*

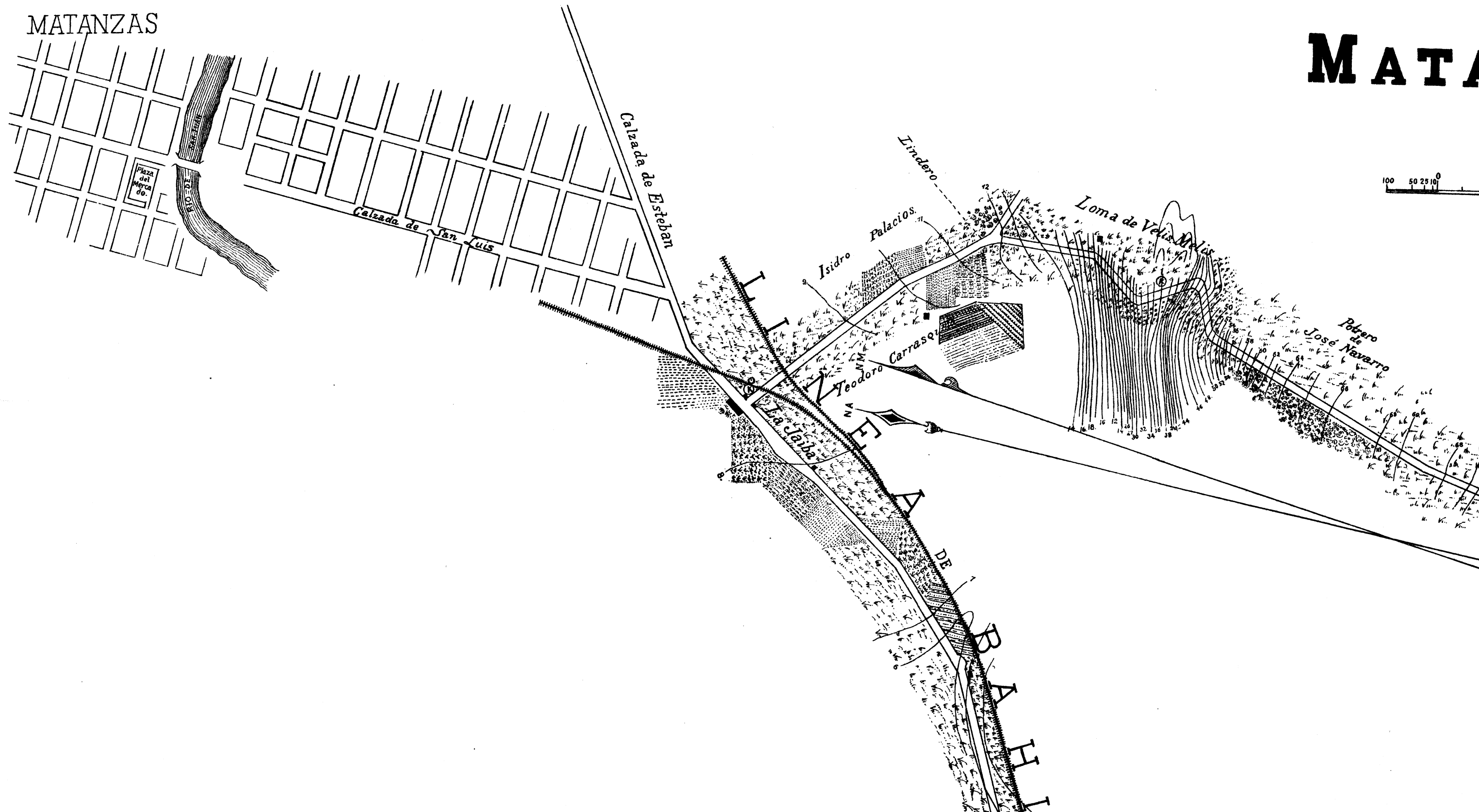
*Juan L. Poch*  
*Ingeniero Jefe*





PLA

MATA

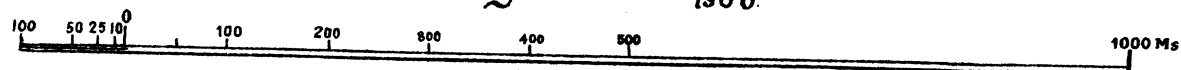


# PLANO DEL CAMINO

DE

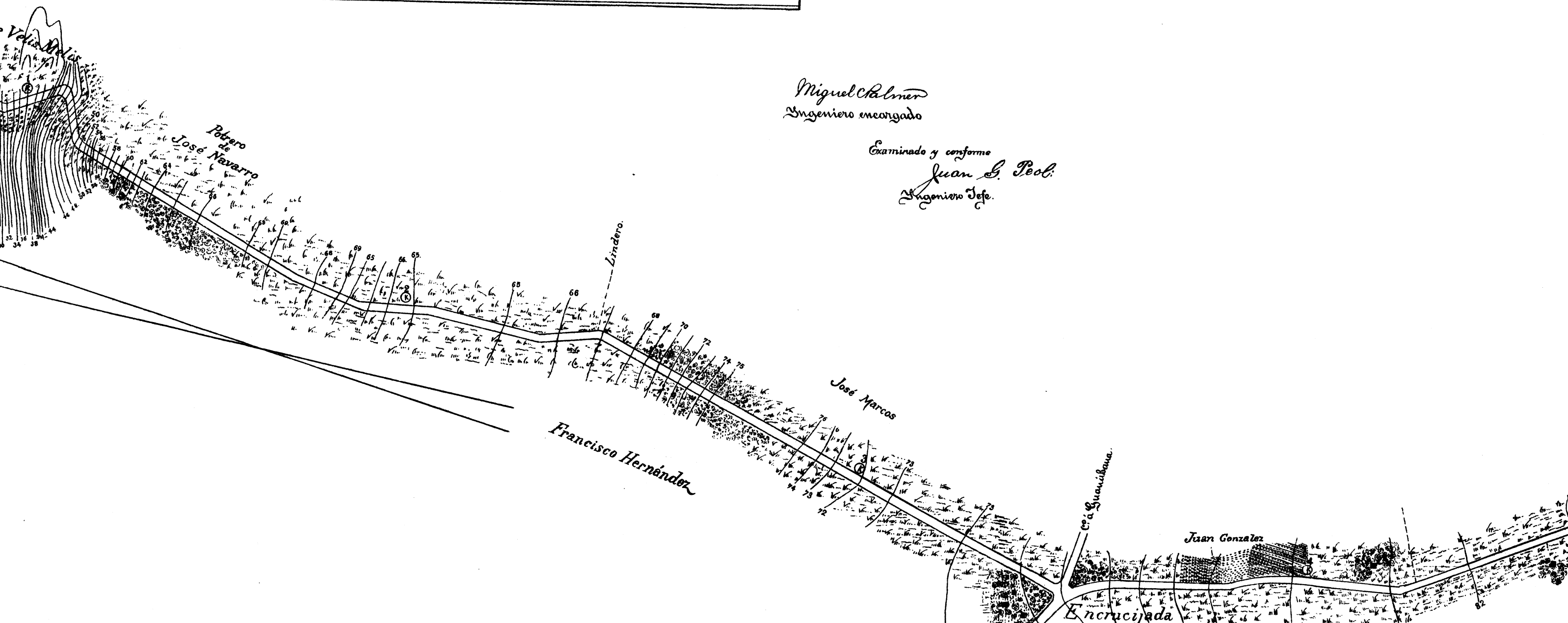
## MATANZAS A CIDRA

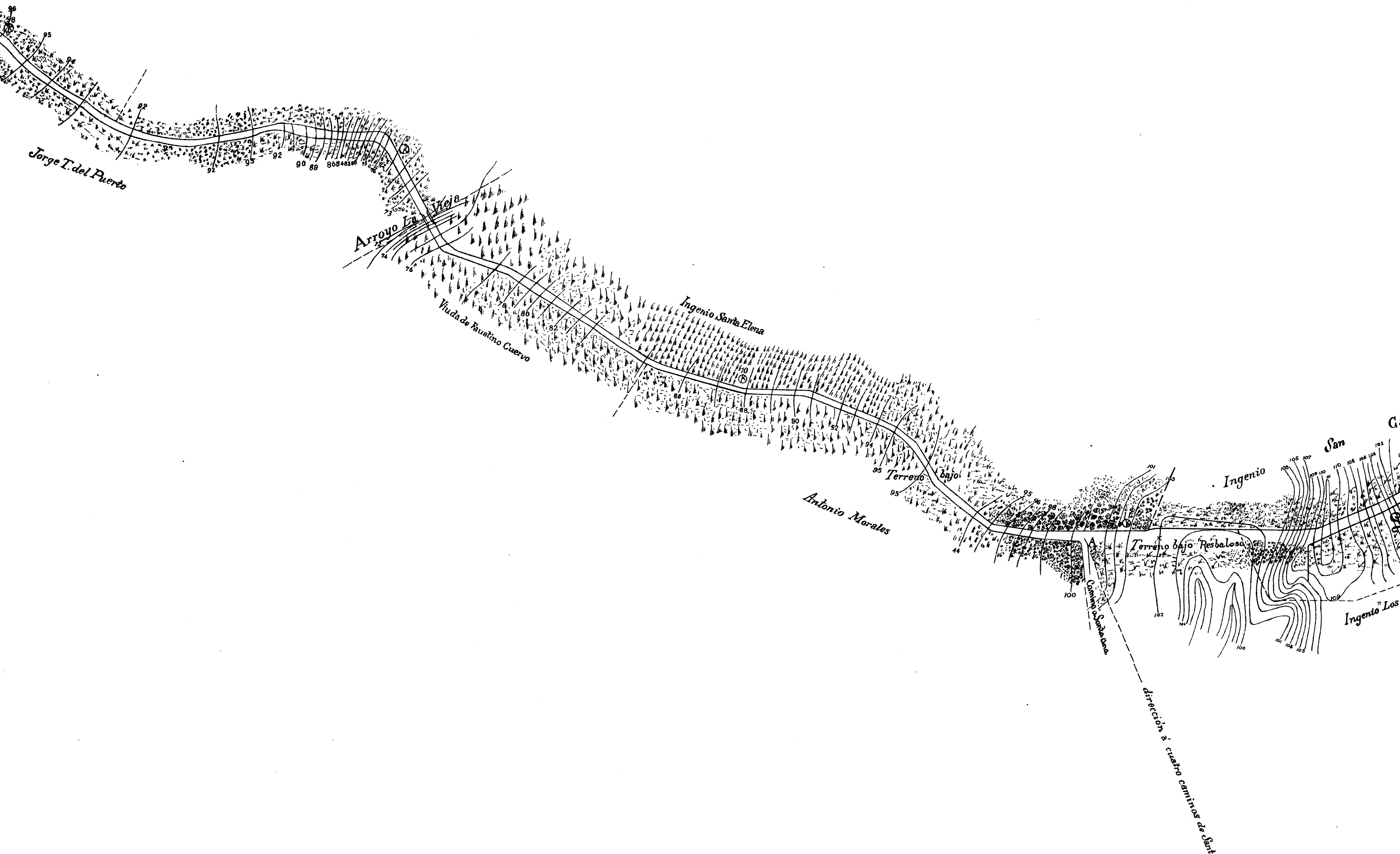
Escala por metros  $\frac{1}{7500}$

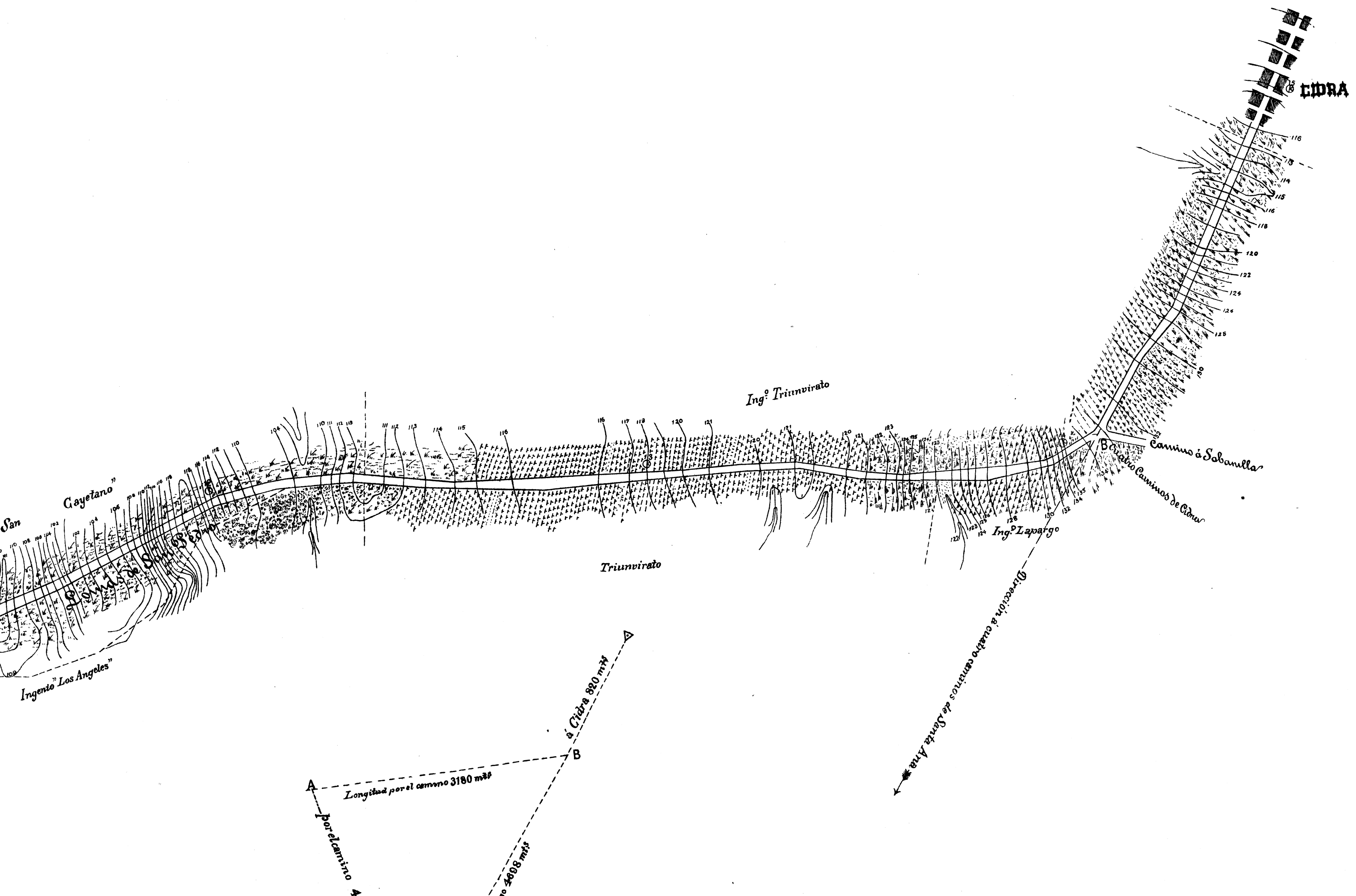


Miguel Chalmers  
Ingeniero encargado

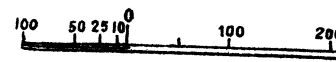
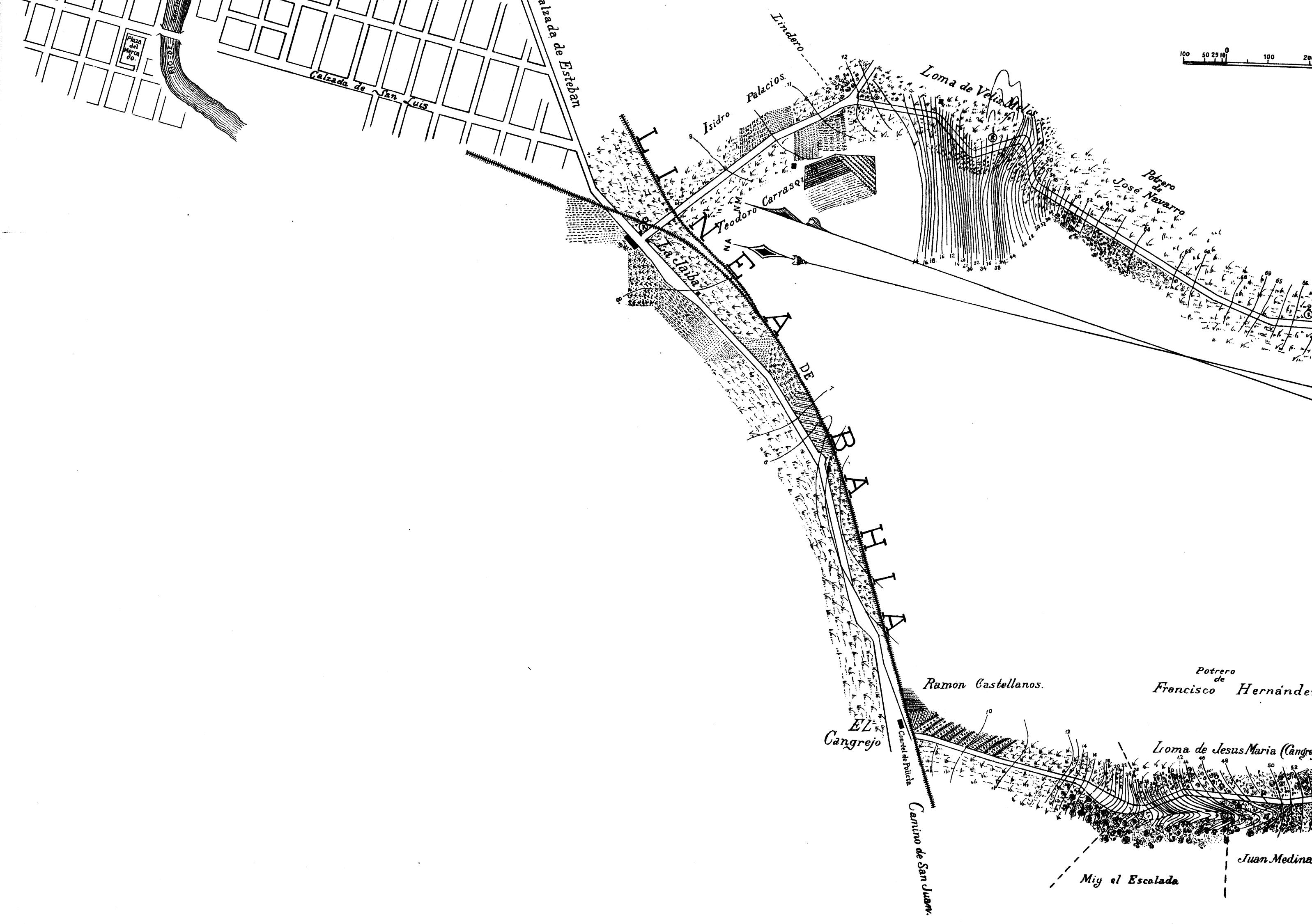
Examinado y conforme  
Juan S. Peol.  
Ingeniero Jefe.











Plaza del Mercado

Calzada de San Luis

Calzada de Esteban

Isidro Palacios

Teodoro Carrasqu

Loma de Velis Melis

Potrero de José Navarro

Ramon Castellanos

Potrero de Francisco Hernandez

Loma de Jesus Maria (Cangrejo)

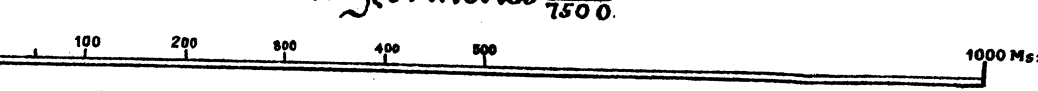
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Mig el Escalada

Carrino de San Juan

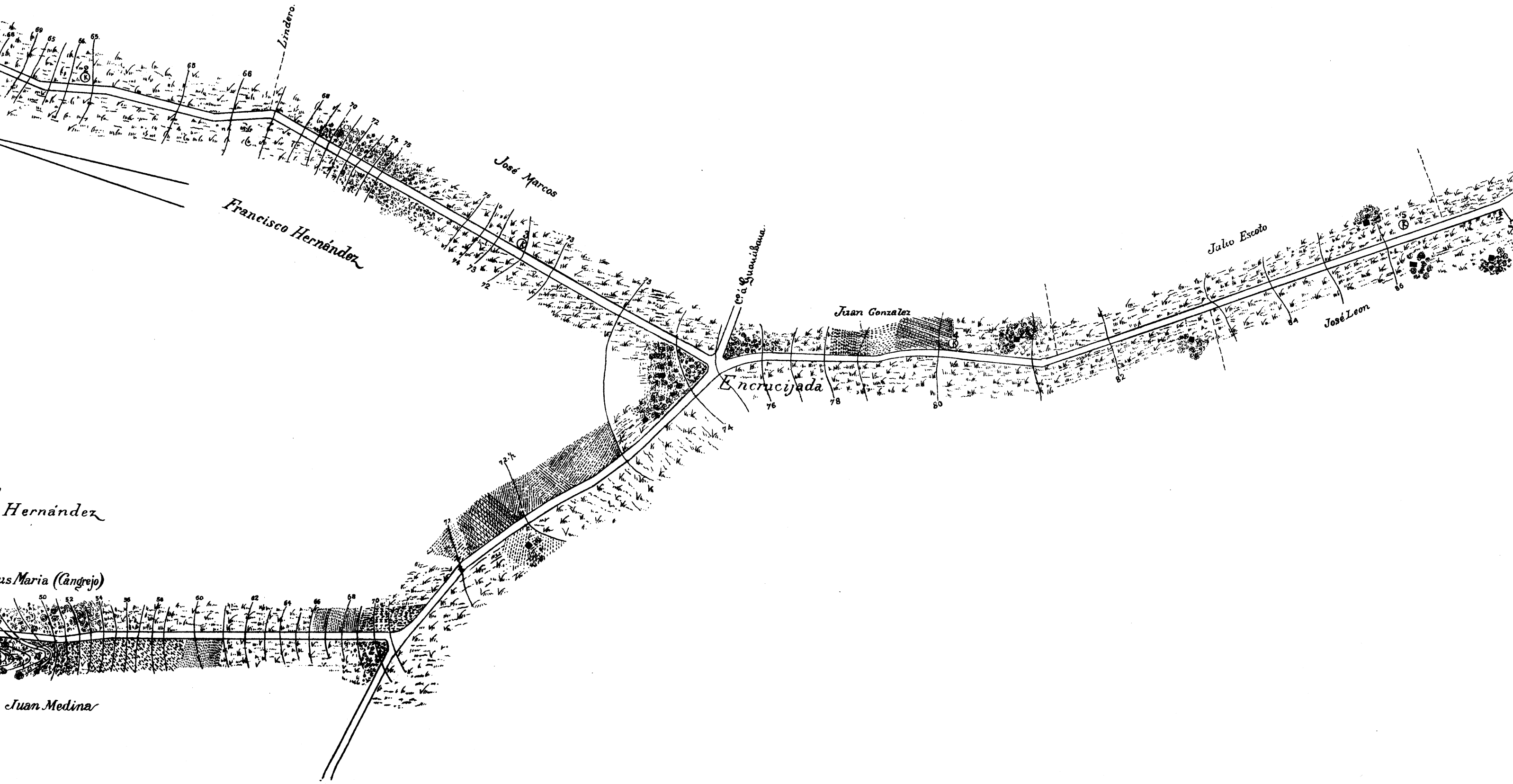
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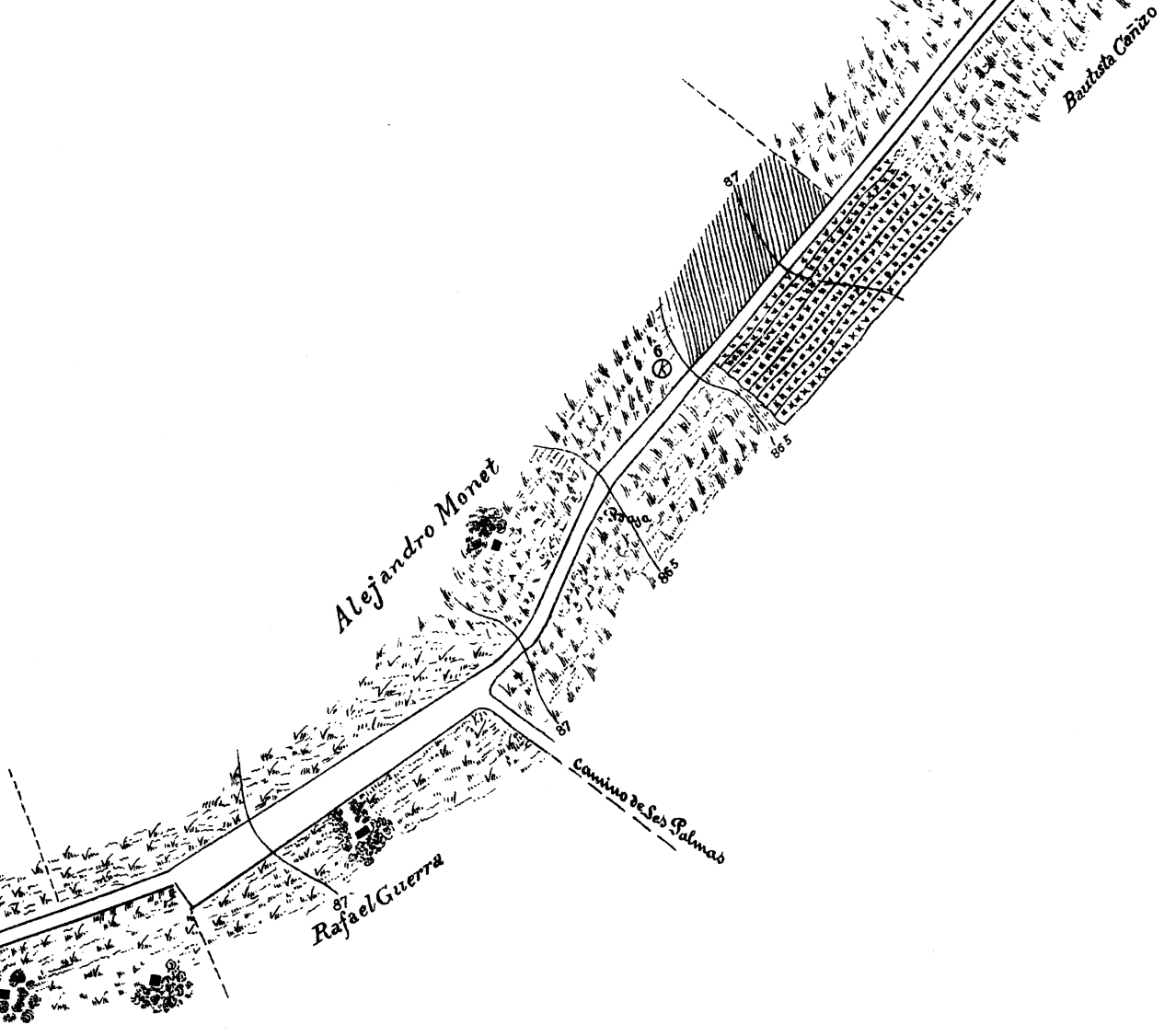
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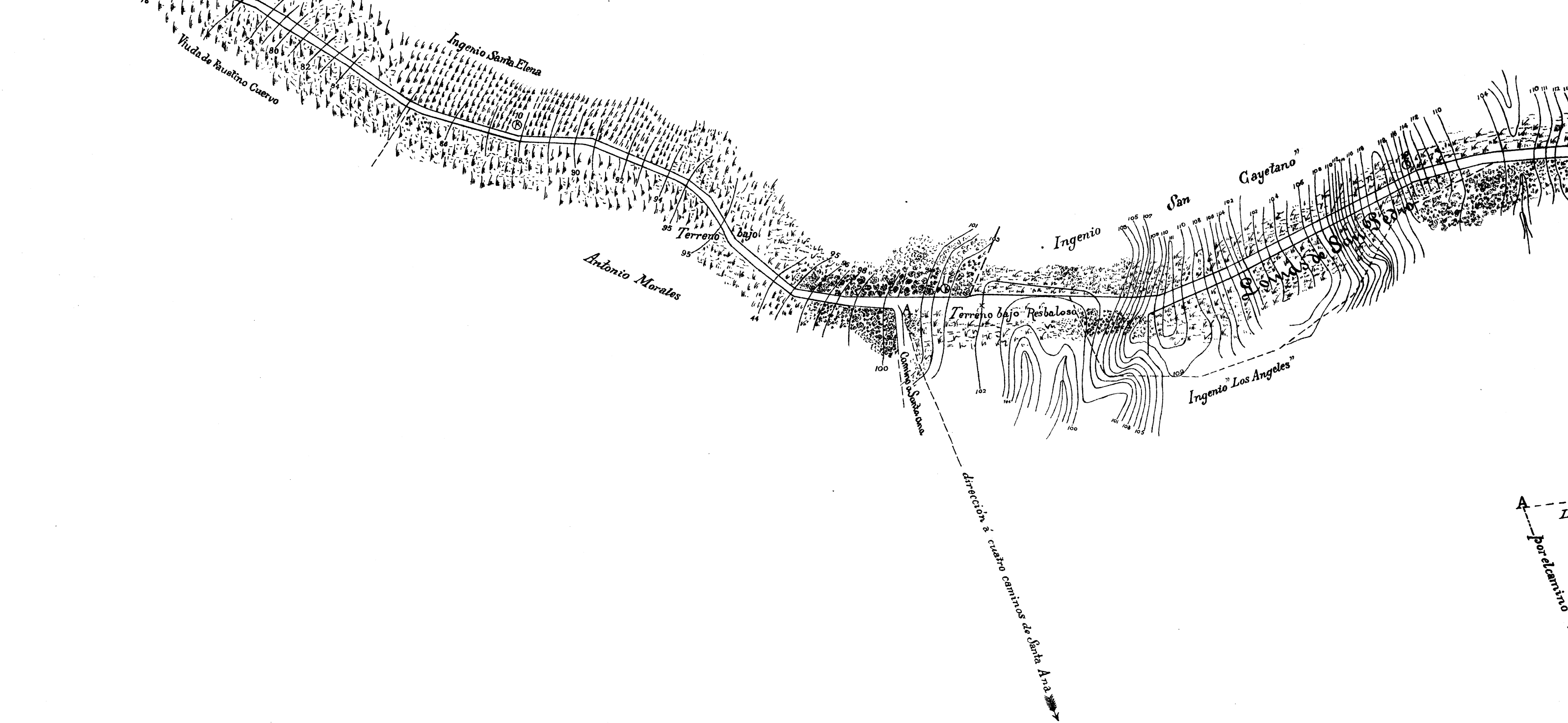


Miguel Palmer  
Ingeniero encargado

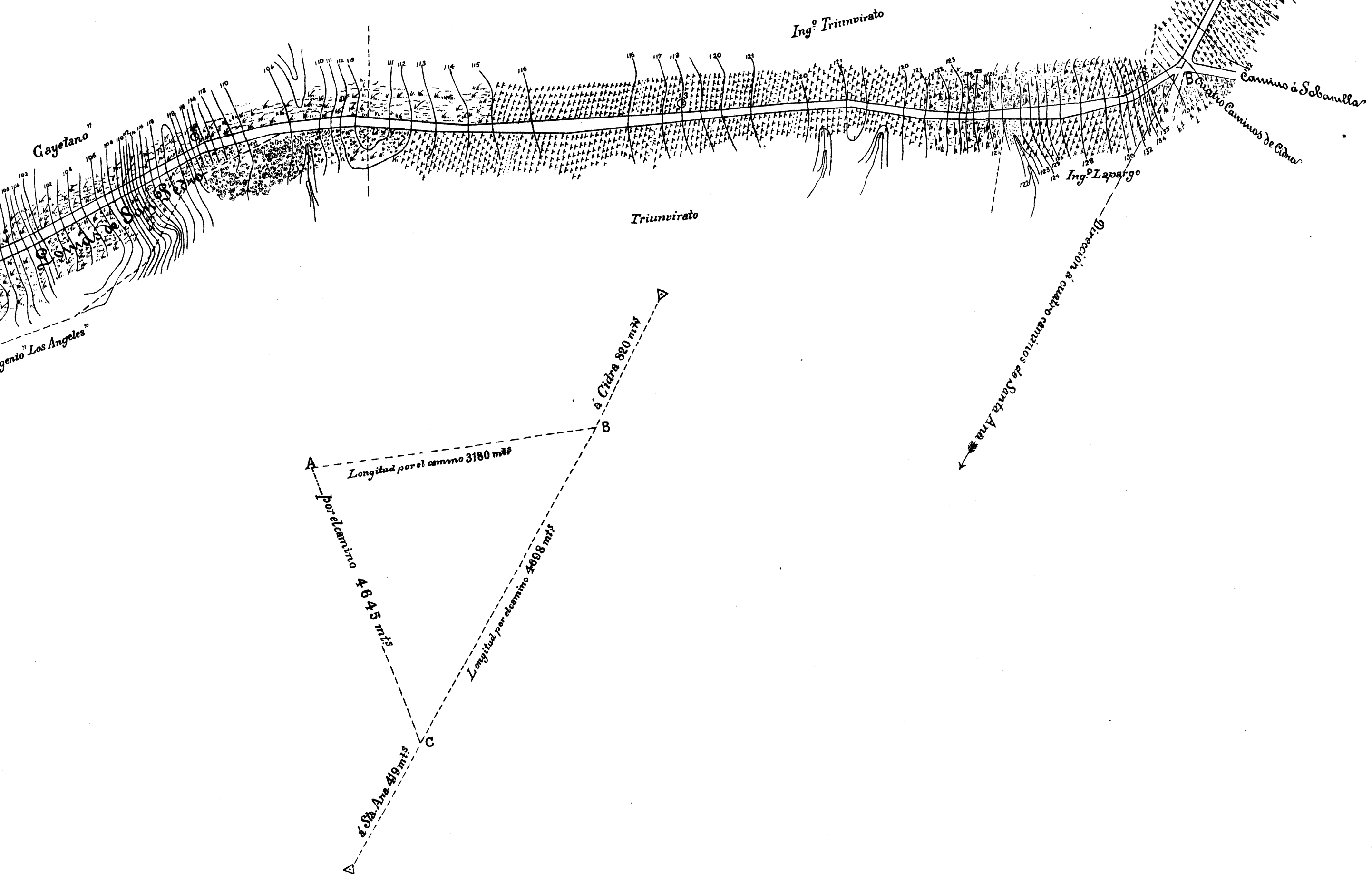
Examinado y conforme  
Juan L. Peol.  
Ingeniero Jefe.





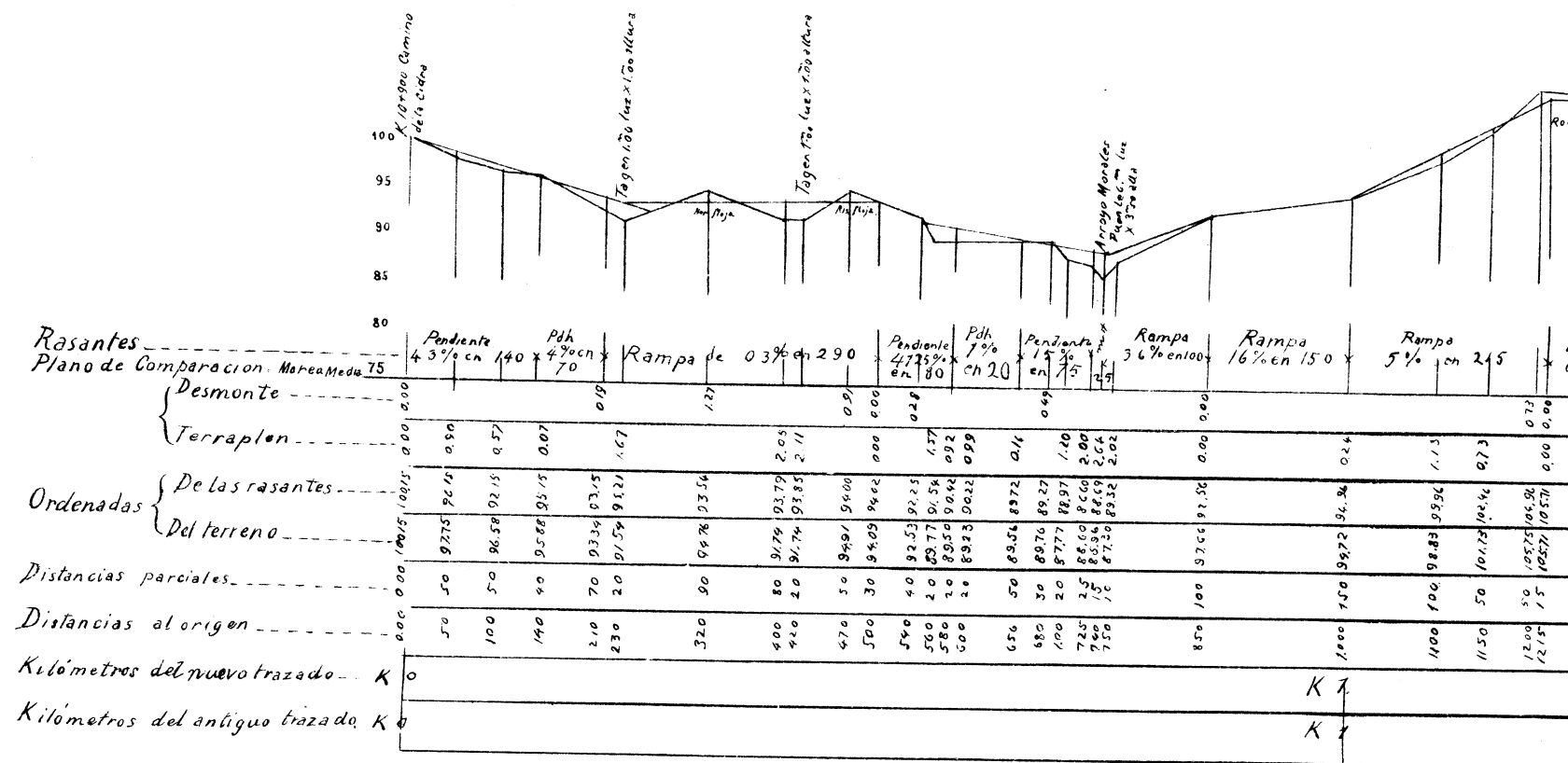


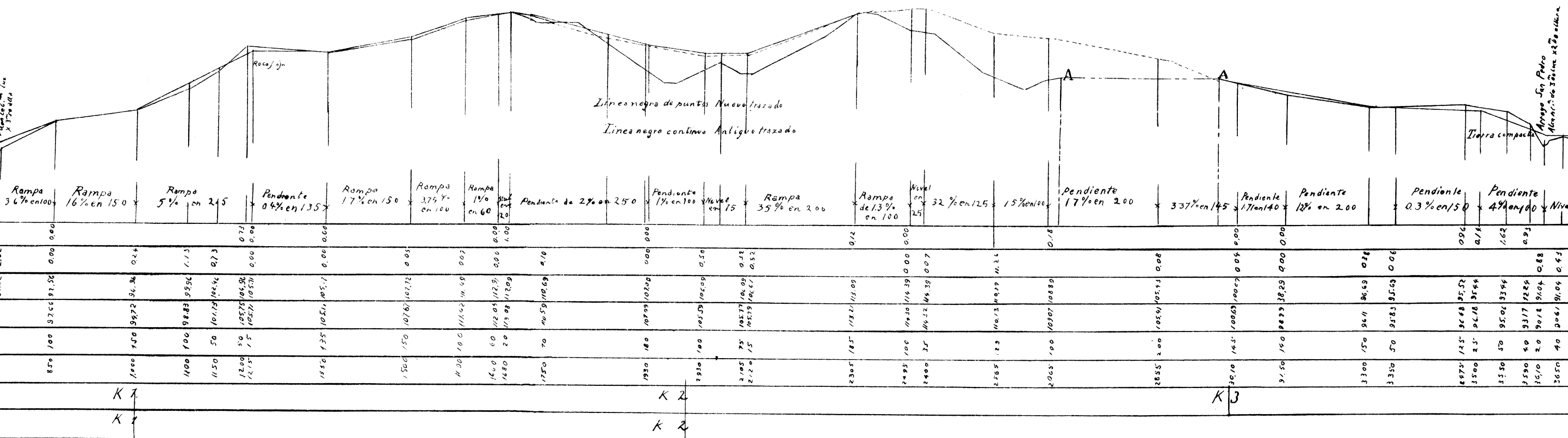
A --- I  
por el camino



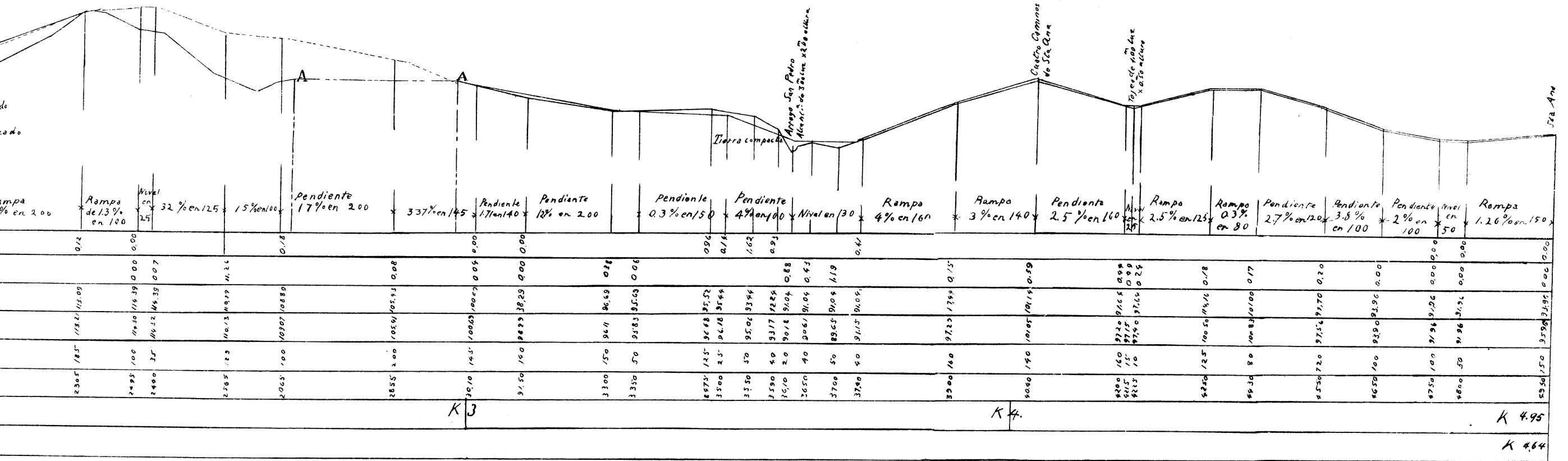


Juan G Peck  
Inglaterra, Texe











# Plano

del ramal à Santa Ana  
en el Cammino de  
Matanzas à la Cidra

Escala de  $\frac{1}{7500}$

Matanzas Agosto 31 de 1900.  
Ingeniero Encargado  
Miguel Palmer

Examinado y conforme  
El Ingeniero Jefe  
Juan B. Pedr

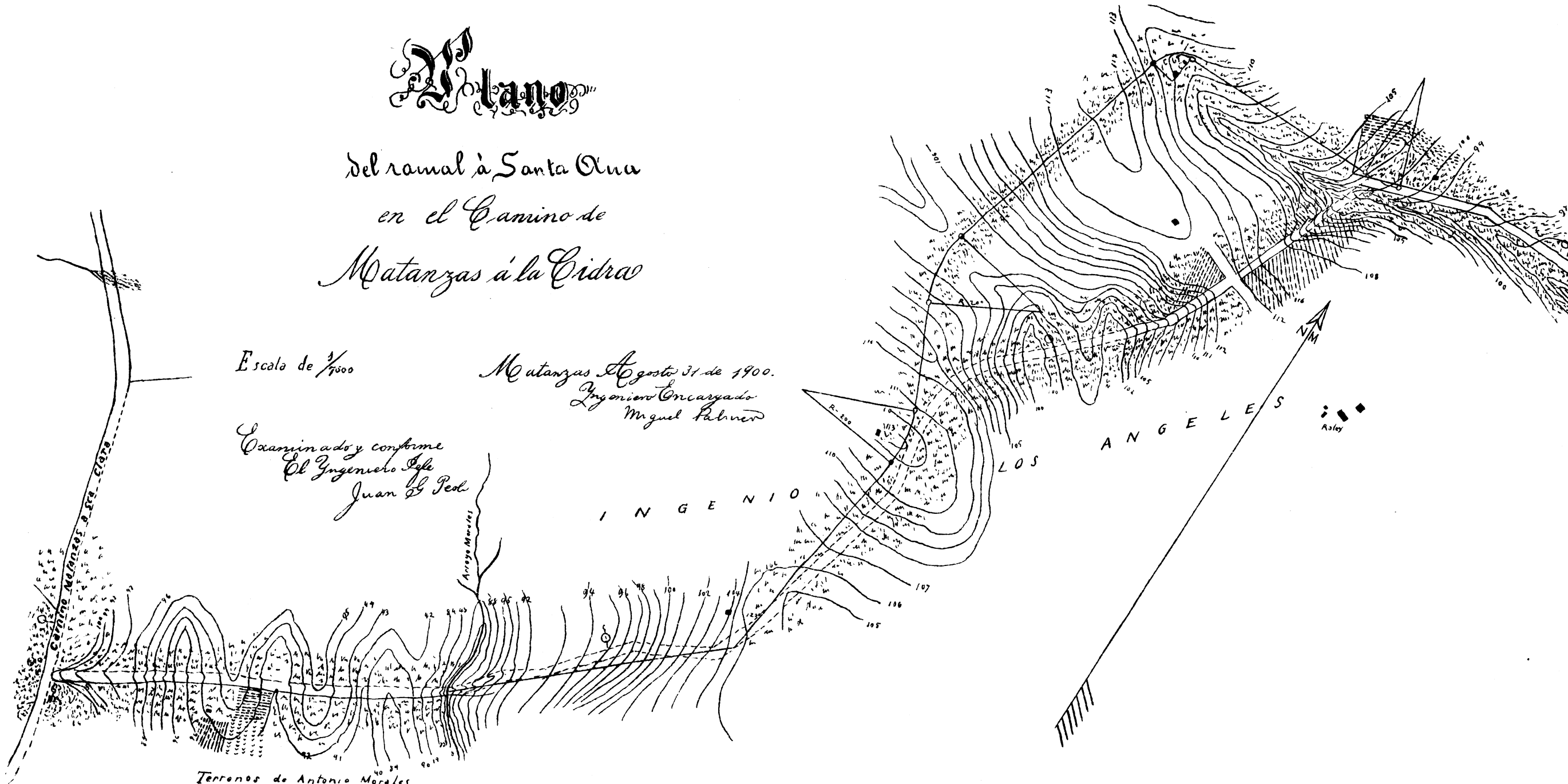
I N G E N I O

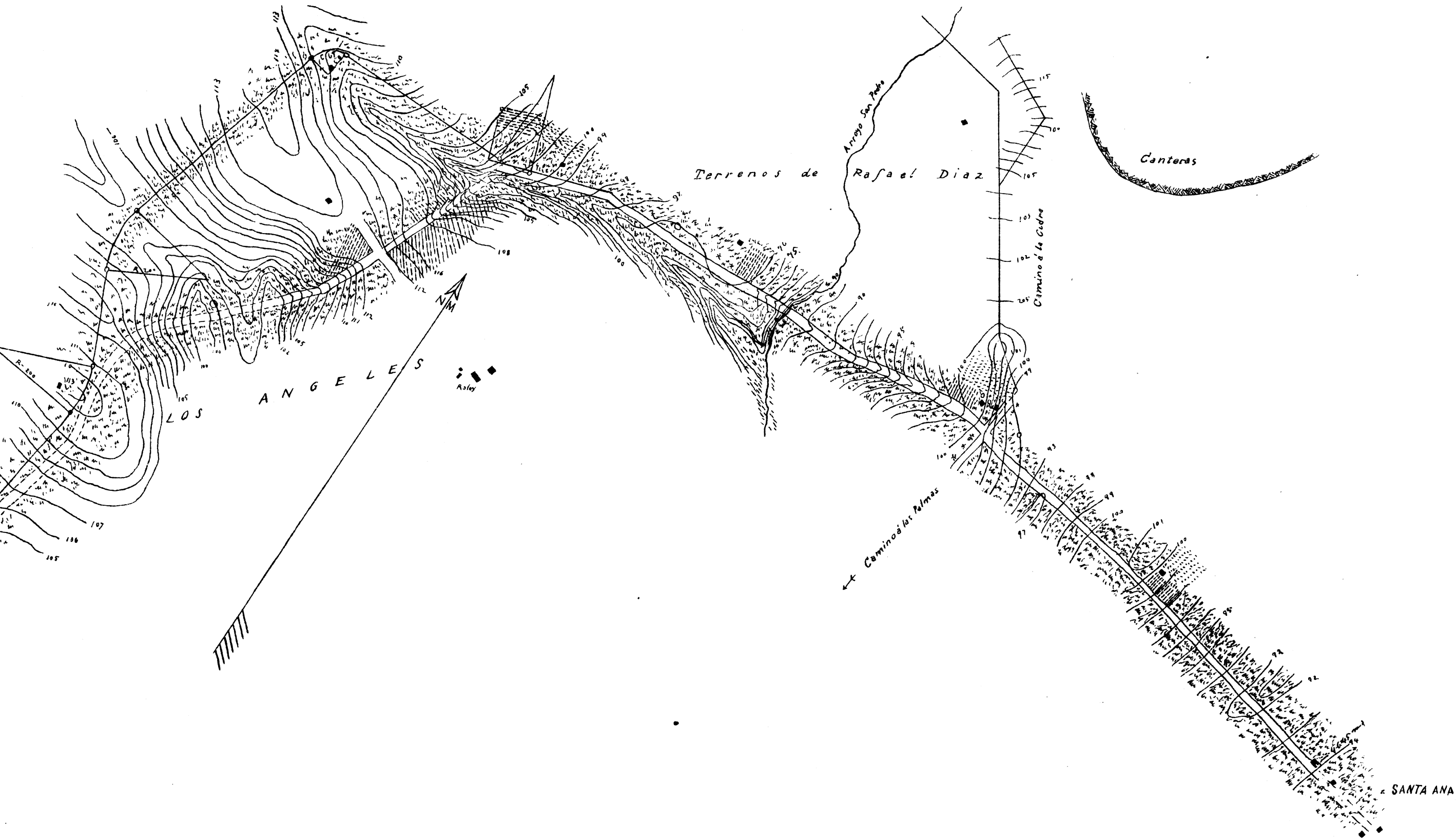
LOS

A N G E L E S

Asley

Terrenos de Antonio Morales







Versil longitudinal  
 Del Camino de Matanzas á la Ciudad  
 Por Delis Melis

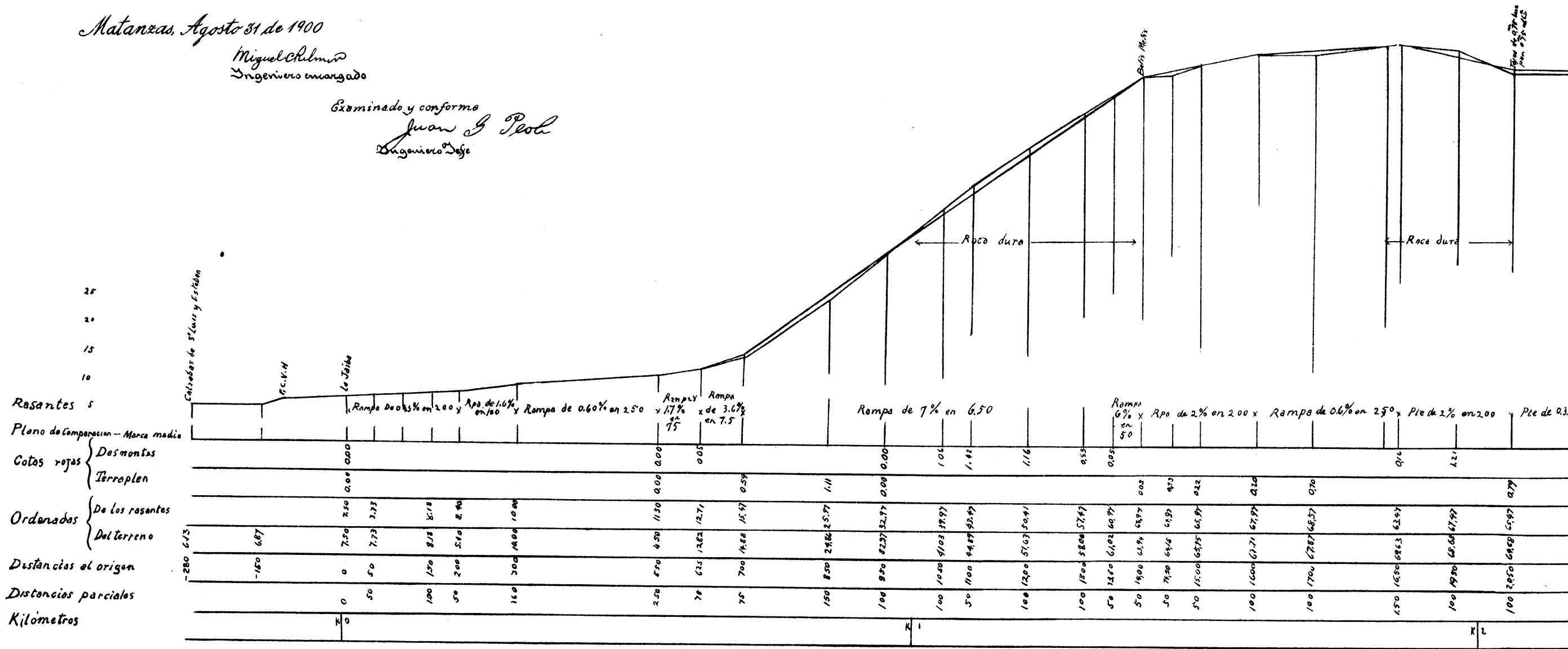
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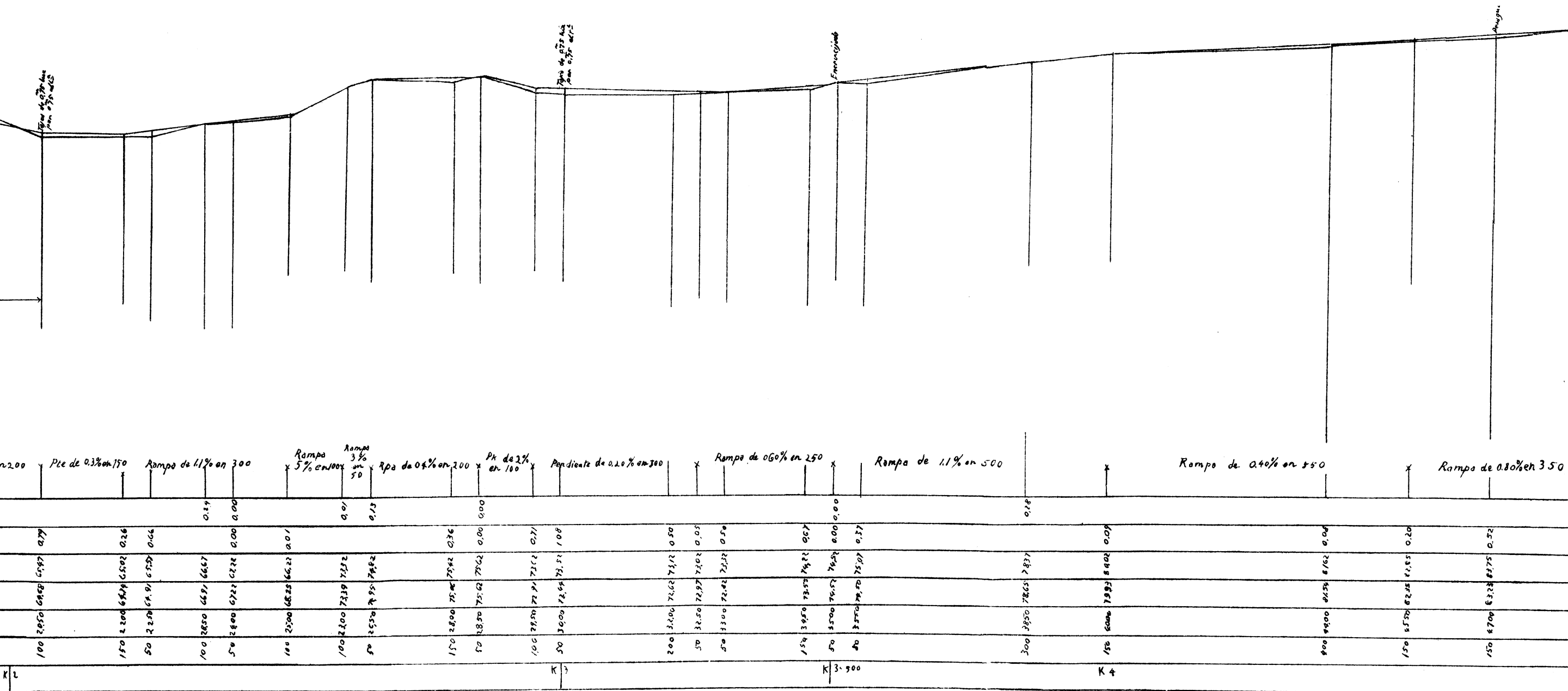
Matanzas, Agosto 31 de 1900

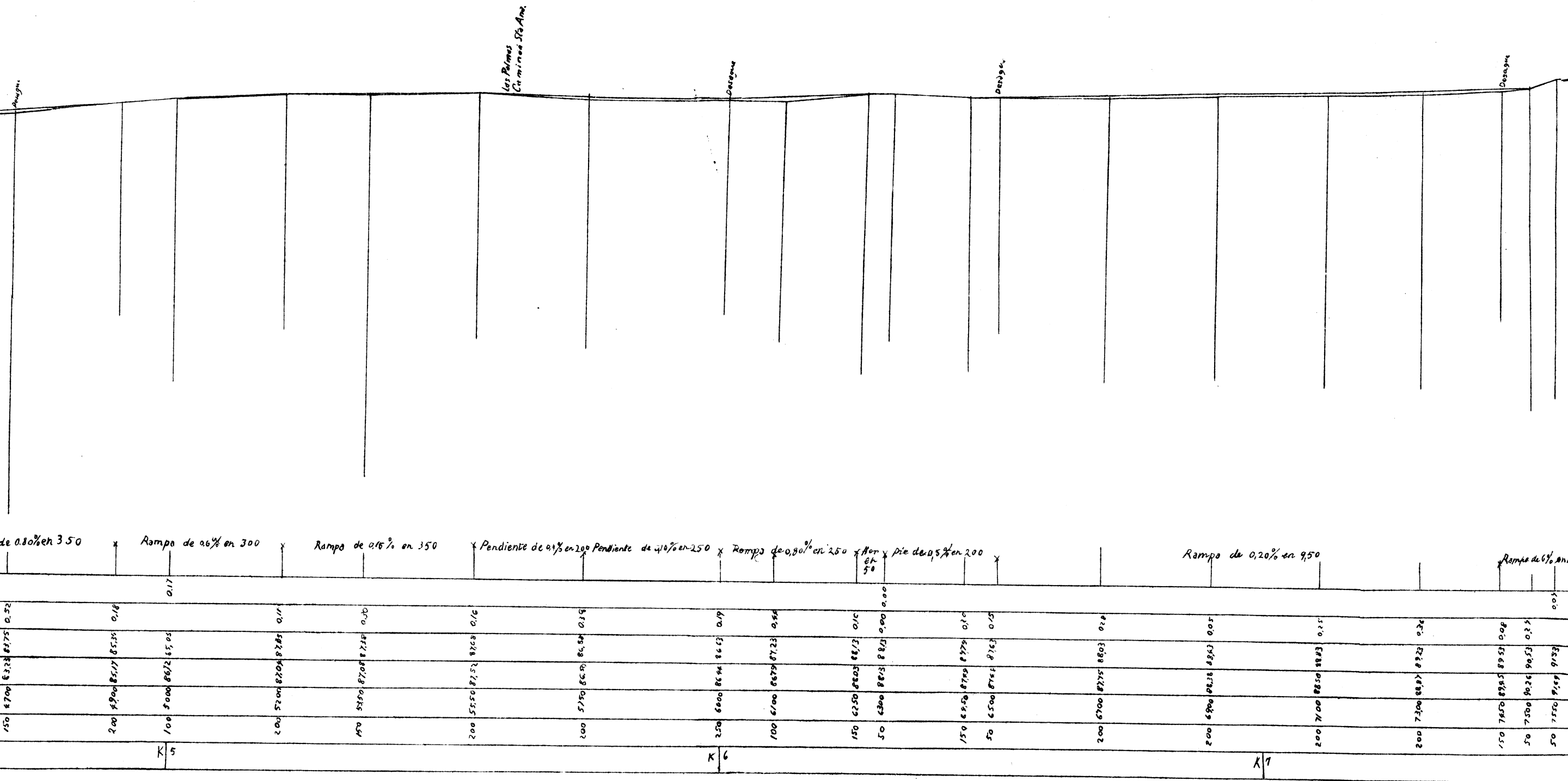
Miguel Culmer  
Ingeniero encargado

Examinado y conforme

Juan G. Peoh  
Ingeniero de Fie

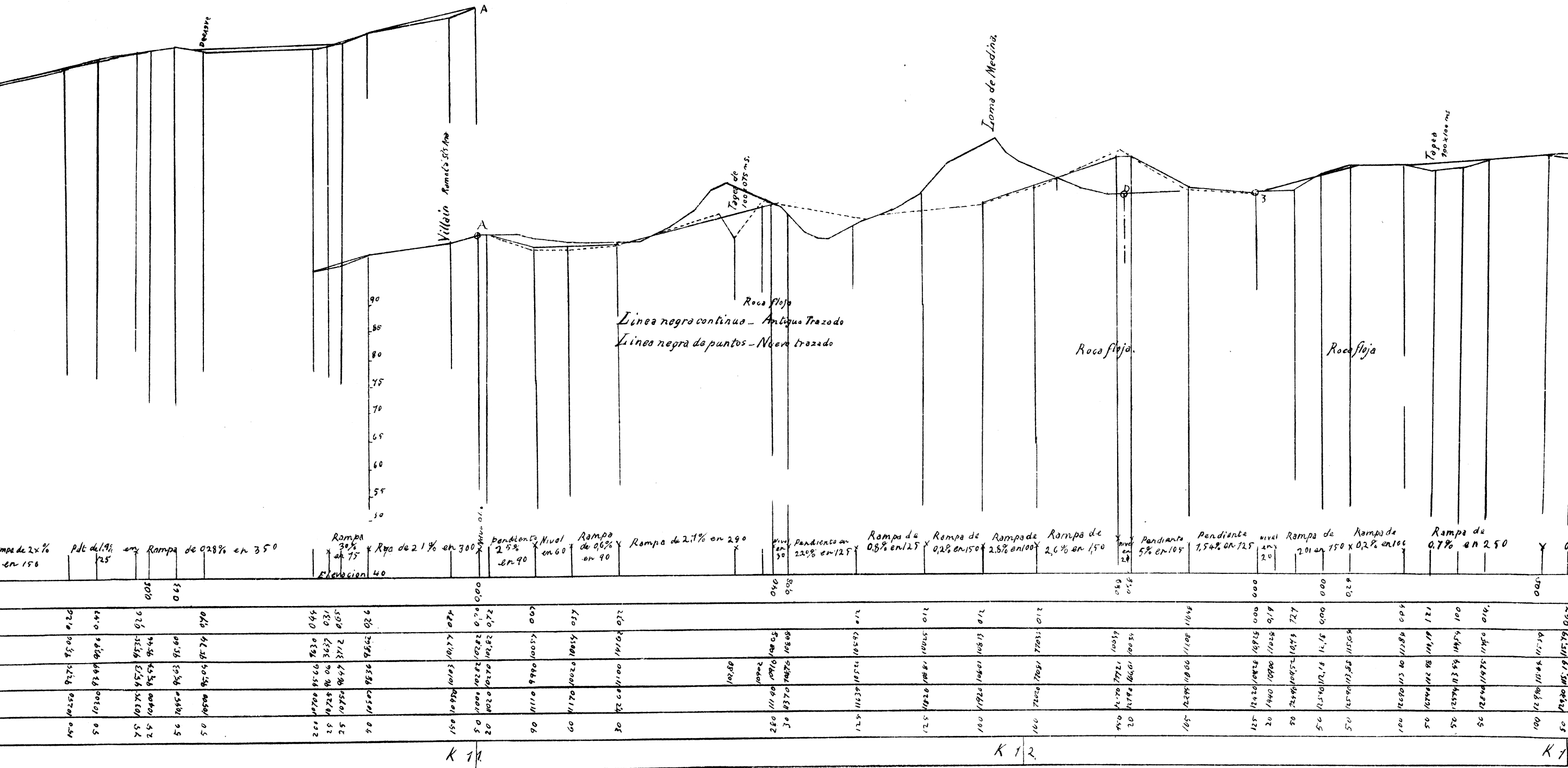








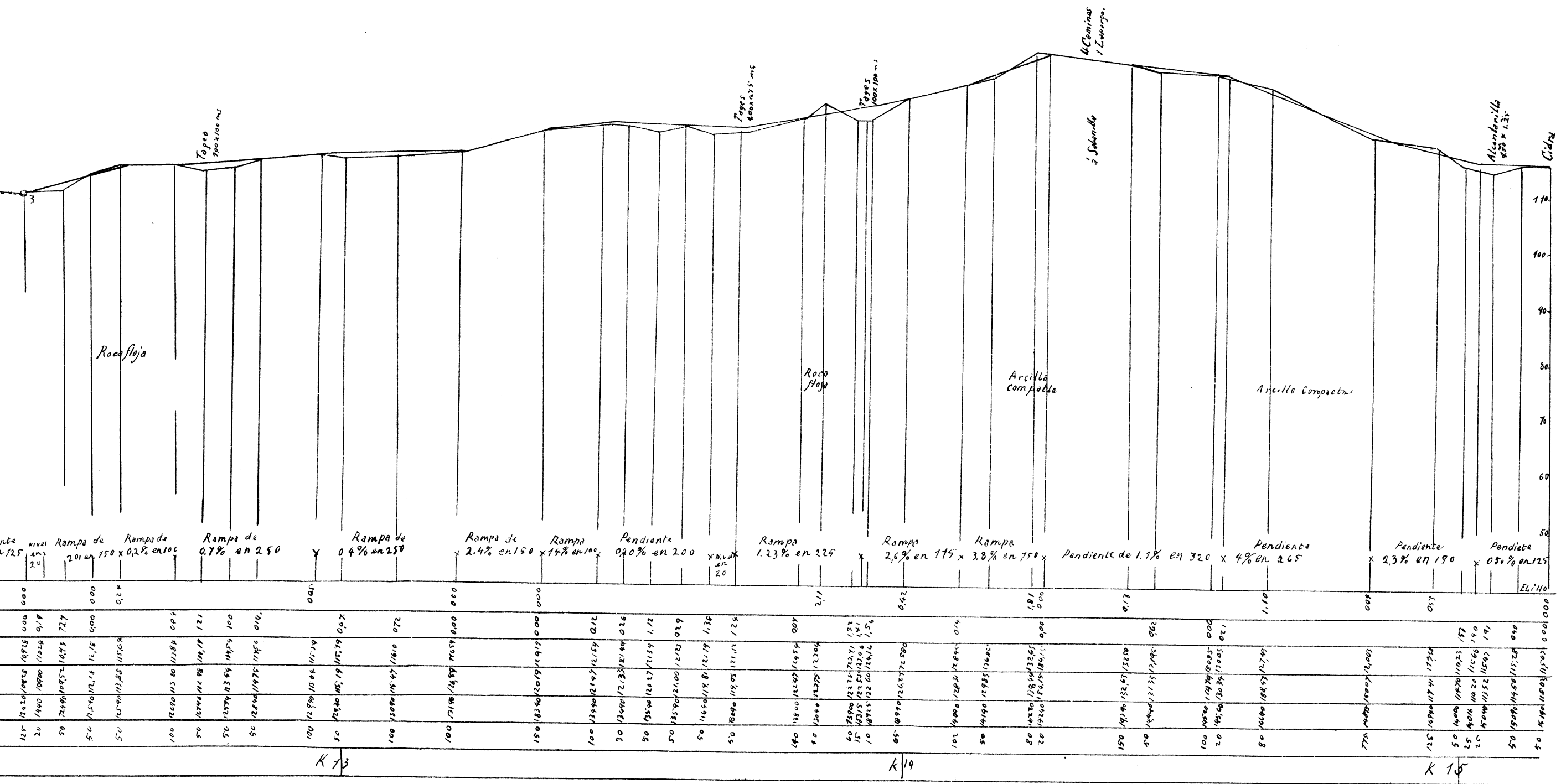




K 11

K 12

K 13





**Plano**

del  
Camino de Santa Ana a la Cidra

Por el Ingenio La Largo

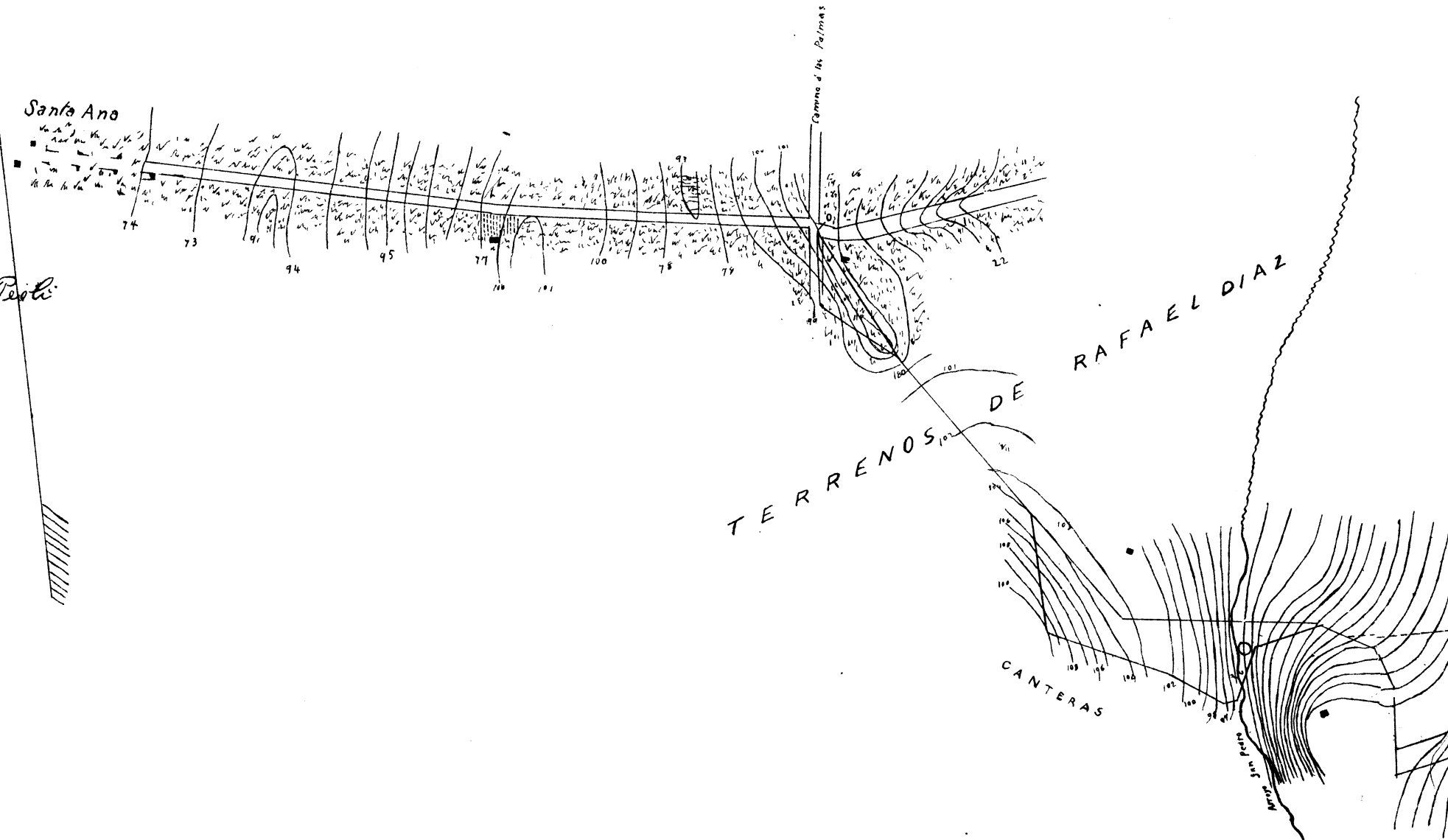
Escala  $\frac{1}{7500}$

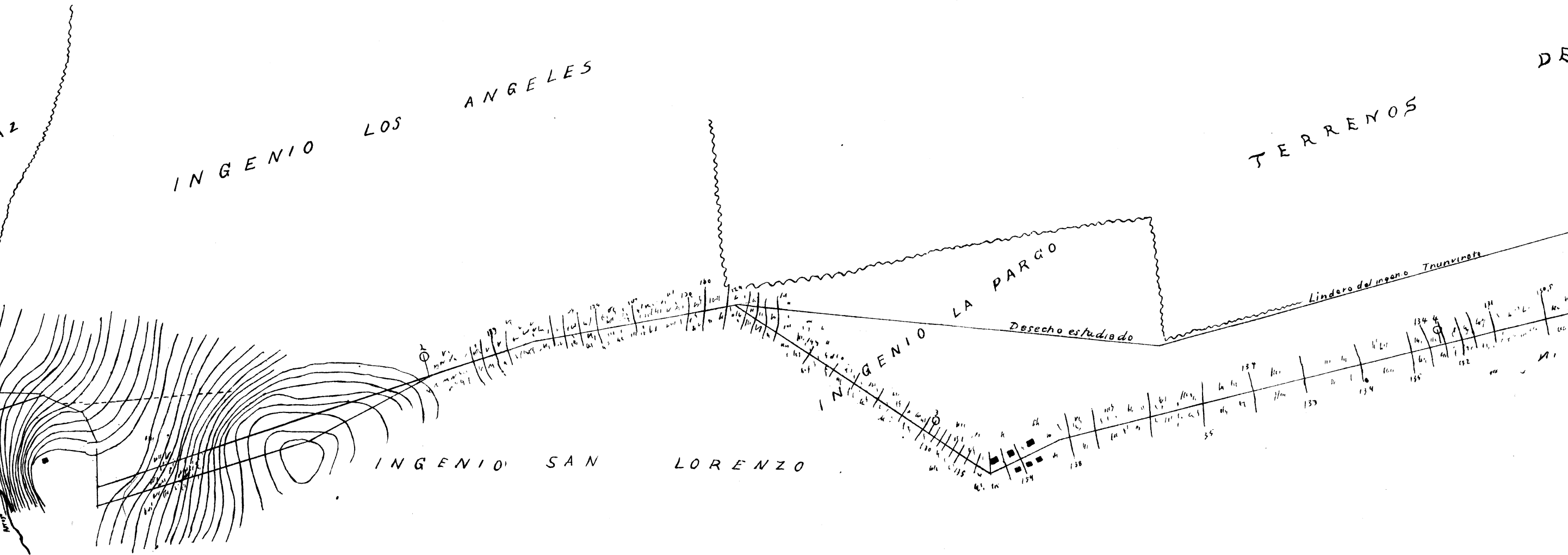
Matanzas Agosto 31 de 1900

Miguel Palmer  
Ingeniero encargado

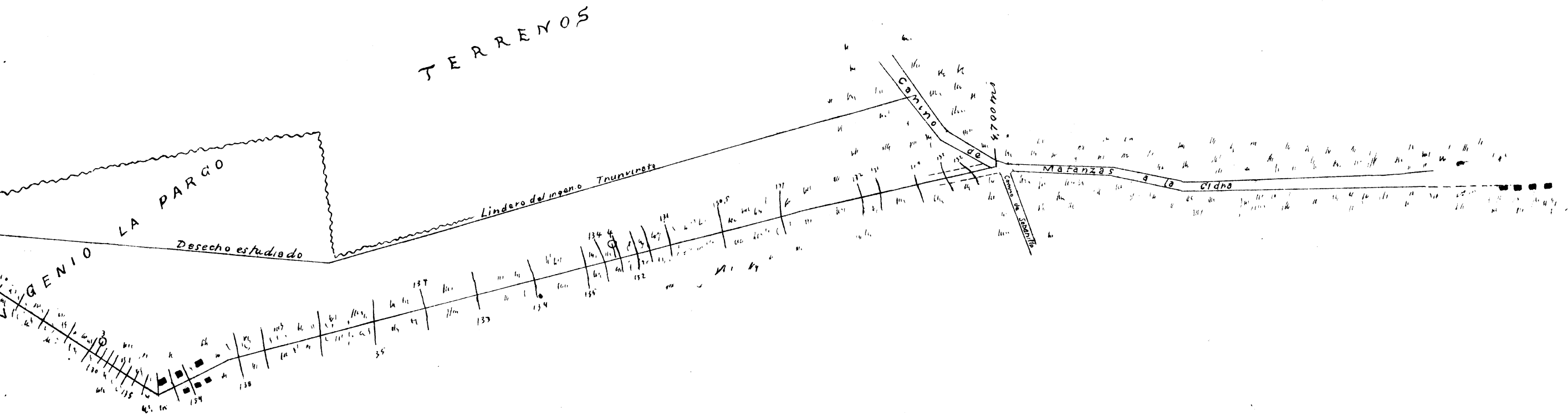
Examinado y conforme

Juan E. Teófilo  
Ingeniero Jefe





TERRENOS  
DEL INGENIO TRIUNFATORIO







# Plano.

del 2.º

Nuevo desarrollo en la loma de Belis Melis.  
del.

Camino de Matanzas a la Ciénega

Escala  $\left\{ \begin{array}{l} \frac{1}{2000} \text{ horizontal} \\ \frac{1}{500} \text{ vertical} \end{array} \right.$

Matanzas 31 de Agosto de 1900.

Nagual Calmer  
Ingeniero Encargado

Examinado y aprobado  
Juan S. Peck.  
Ingeniero Jefe.

El camino

Ordenadas

$\left\{ \begin{array}{l} \text{Del terreno} \\ \text{De las rasantes} \end{array} \right.$

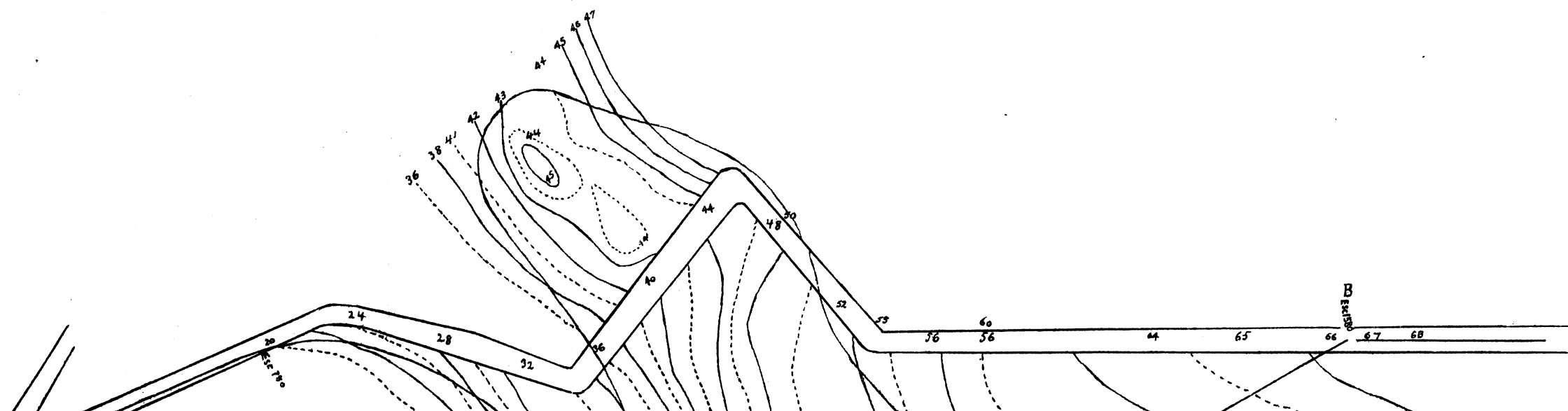
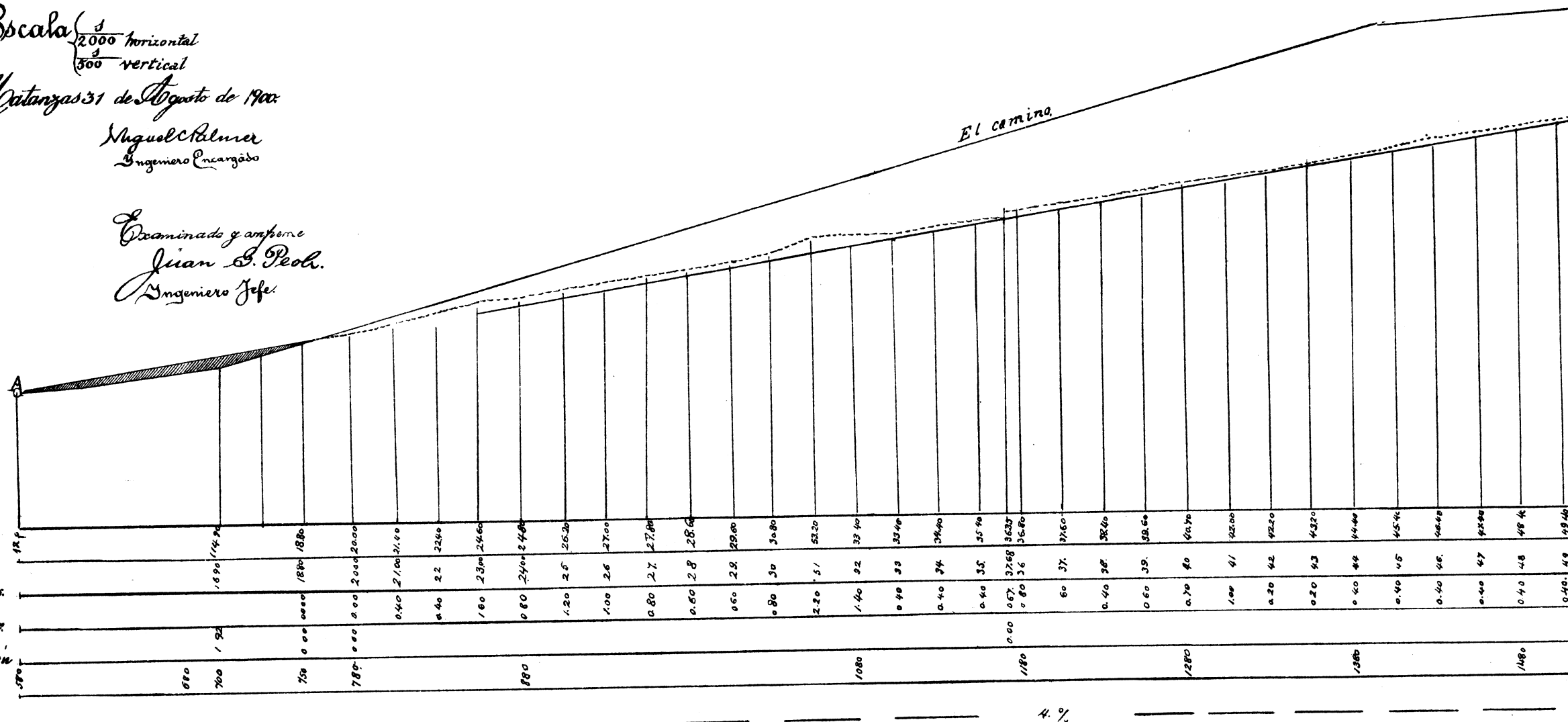
Cotas rojas

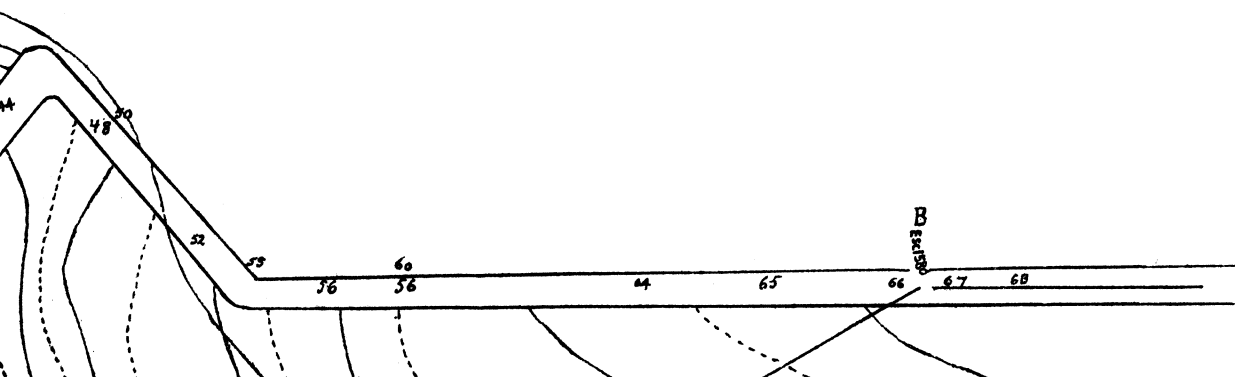
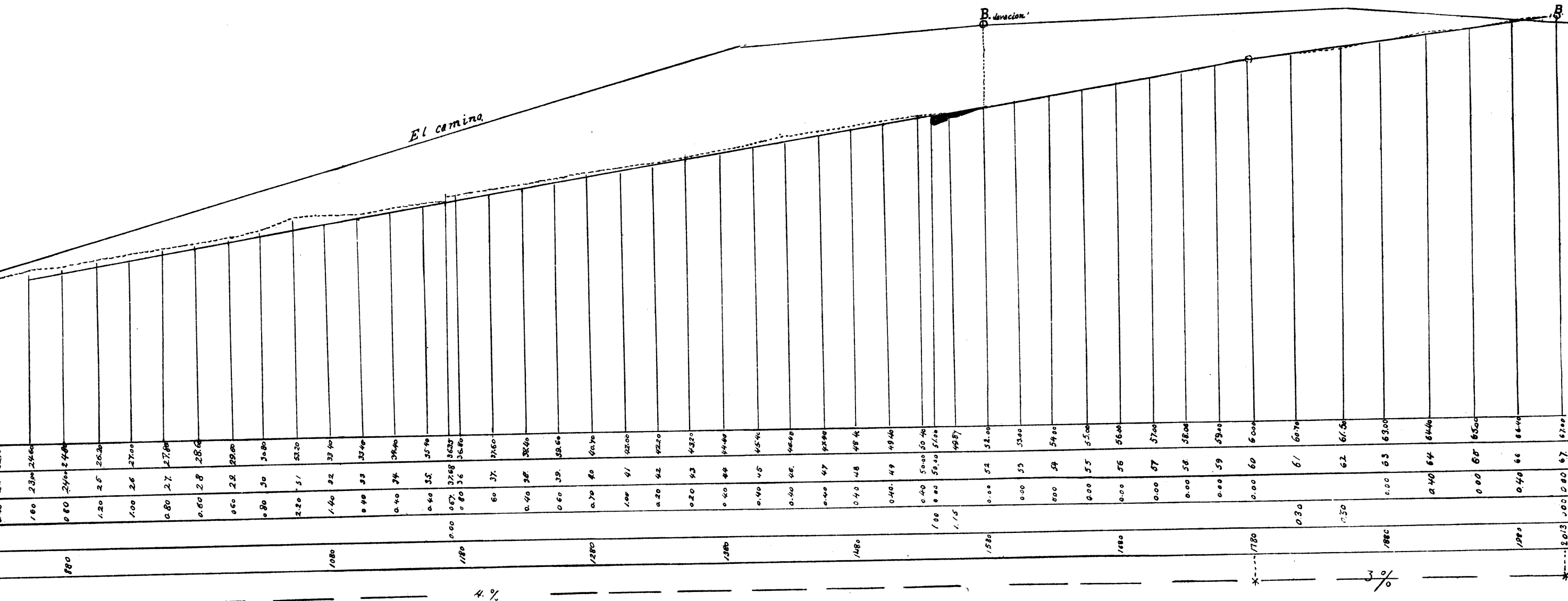
$\left\{ \begin{array}{l} \text{Desmonte} \\ \text{Terraplen} \end{array} \right.$

Distancias al origen

Escalas

Horizontal  $\frac{1}{5000}$  Pendiente  
Vertical  $\frac{1}{750}$





Matanzas 31 de Agosto de 1900.

Nagual Palmer  
Ingeniero Encargado

Examinado y aprobado  
Juan E. Peol.  
Ingeniero Jefe.

El camino

Ordenadas

*Del terreno*  
*De las rasantes*

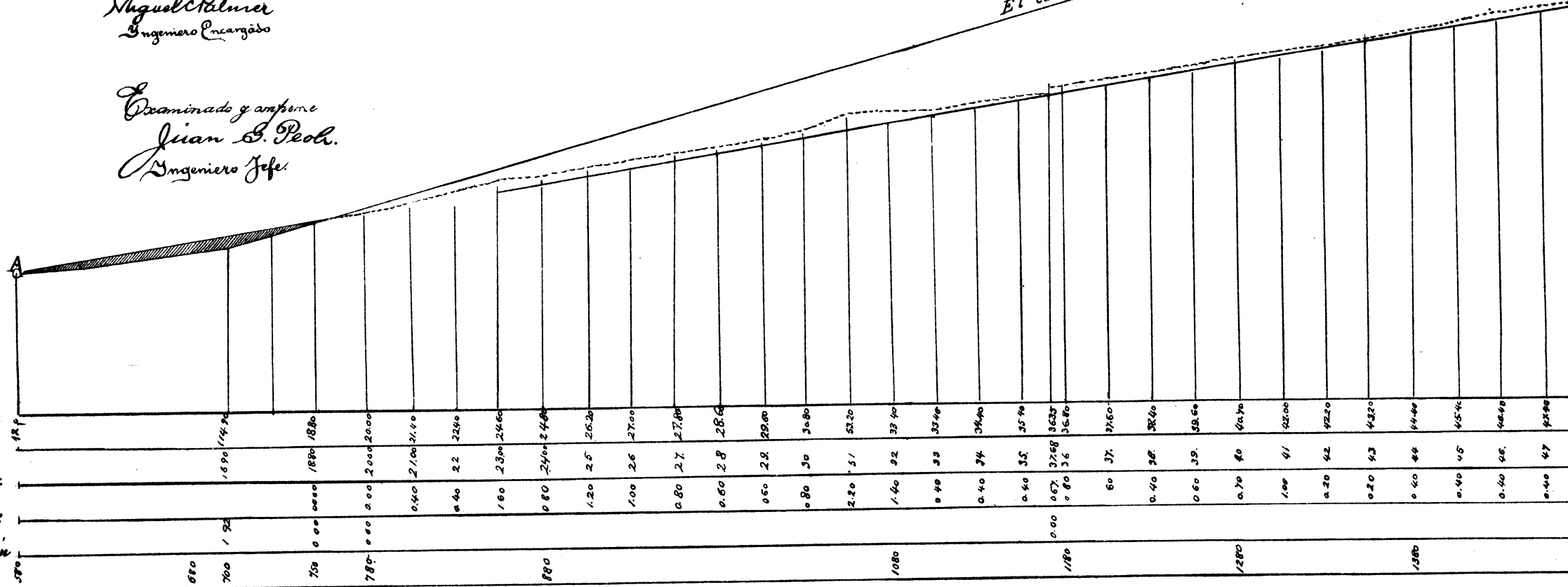
Cotas rojas

*Desmonte*  
*Terraplen*

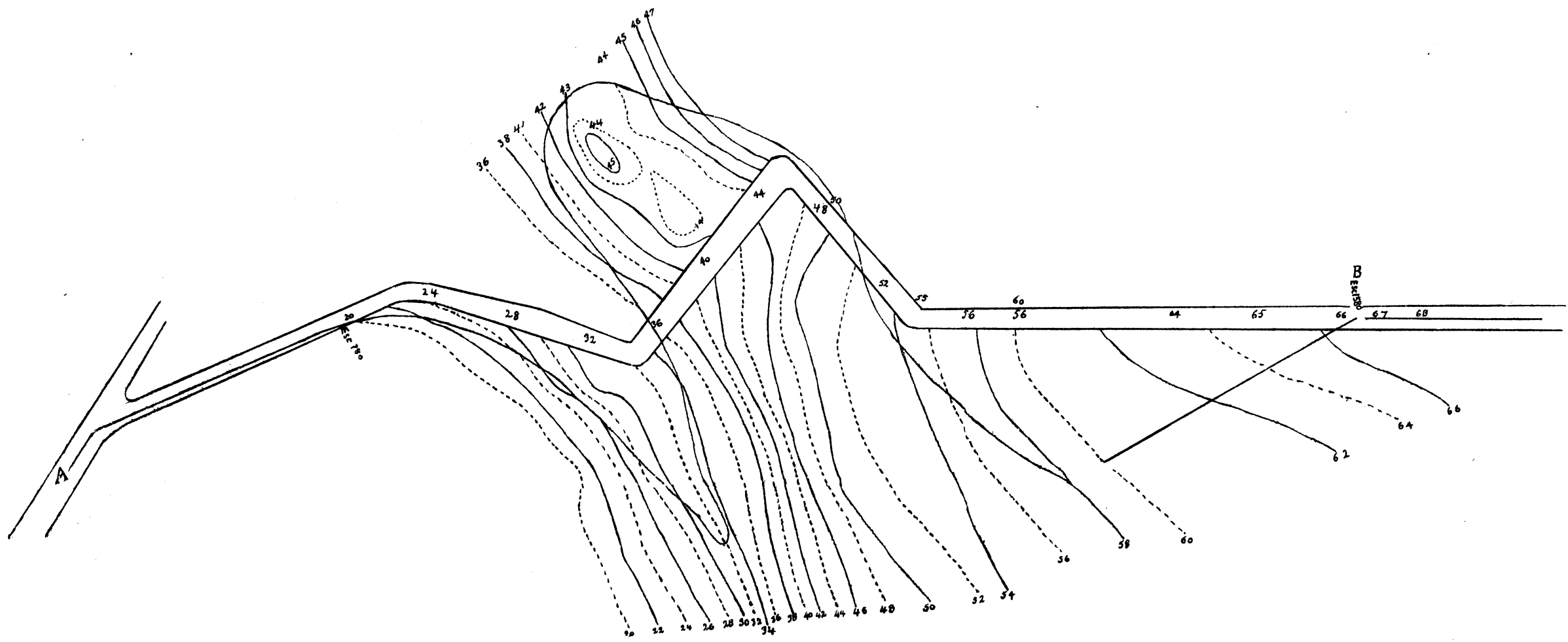
Distancias al origen

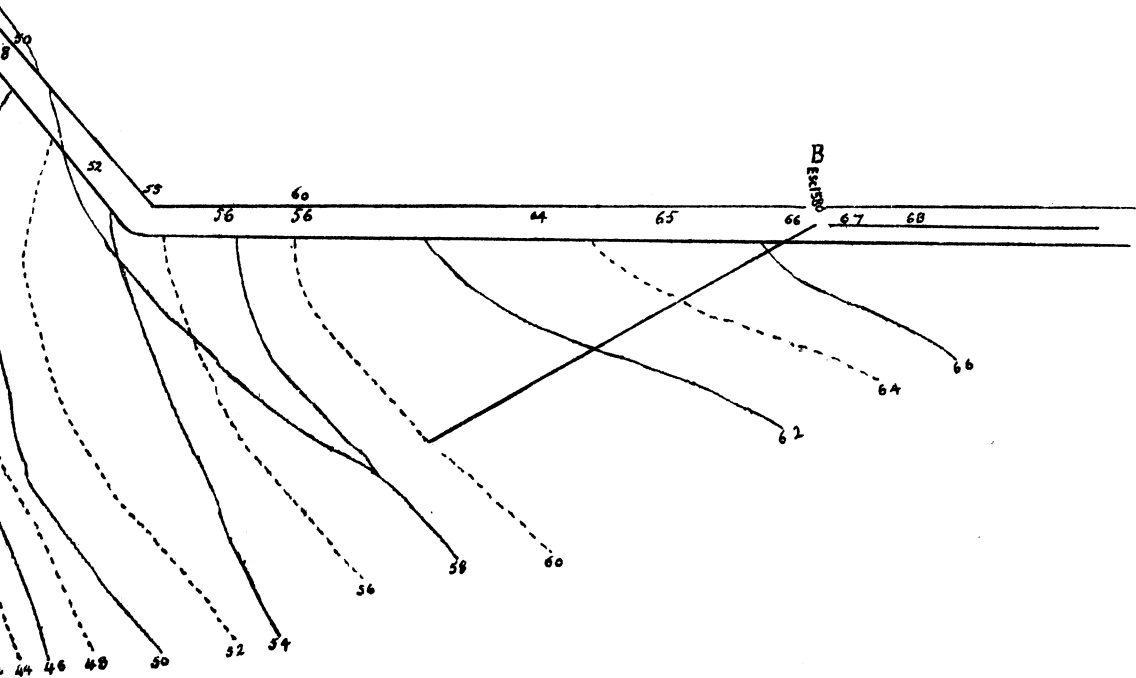
Escalas

Horizontal  $\frac{1}{3000}$  Pendiente  
Vertical  $\frac{1}{750}$



4 %







In the study of currents it has also been observed that the change of the tide does not occur simultaneously in all parts of the bay, nor even in the same transverse belt. For example, to the north of section N (plans and outlines) the tide commences to run in first in the Hicacos channel, afterwards in Buba channel, later on in Diana channel, and finally in the shoal places. A float placed in the Hicacos channel at the beginning of the flood tide is carried in the first half hour on a course from E. to SE; that is to say, it crosses the main channel of the space J to LL, where the current of the latter is felt and forces it to turn toward the south. (See currents A and B.) At ebb tide it was observed that to the southward of the central shoal, or that is, section E, the tide ebbs first at Diana Key and twenty minutes afterwards at Buba Key. See currents R, S, T, and V, marked out by floats all placed simultaneously at the northern part of the shoal, but which, according to the channel they took, varied in velocity and direction. It is also to be noted that the said currents allow the study of the intervals of time between the highest flood and the beginning of the ebb. This phenomenon is shown in the plan of the variations of tide sent herewith, in which it may be seen that the full ebb at Buba Key was at 8 o'clock, at Diana Key at 8.30 o'clock. That the tide changes at Diana Key at 9 o'clock, and at Buba Key changes at 9.20 o'clock.

The long period without change that we note at Buba Key, together with the fact of the tide gauge being placed on the alfaques (sand shoals) seems to explain why the very fine sand is so firm which forms the western shore of the Buba channel. In the same manner such a marked difference in velocity will aid us to explain later on the reason for the formation of the Diana Key shoals and flats. Other currents, as those of M, N, P, and Q, in turn give us the time that passes between the lowest ebb until the flood commences. It is undoubtable that in these times of relative calmness the grains of sand usually suspended in the water are precipitated to the bottom, and in this way the shoals and flats are formed which close the channels.

By studying the plan of the currents a general phenomenon will be observed, which must directly influence the formation of the central shoal and the flats of Diana Key. In the north part of section H it will be noticed that the currents T, U, V, and W, at the stopping of their inward flow, turn toward the west, that is to say, to the right, while at the south of section F the water, on ceasing to flow out, turns also to the west, but this time it is to the left. This combination, together with the low velocity in the said section, causes the matters in suspension, on being tangentially separated from their curvilinear trajectory to be deposited; those from the north to the south and those from the south to the north, thus causing the shoals and flats of Diana Key to be increased in size.

A proof of the effect of this movement will be had by examining the transverse outlines herewith sent and noting the section from E to I. It will be seen by the thickness of the layers, the nature of the material, and the incline of the same, that the deeper this belt is penetrated, that is to say, in G and H, the greater, finer, and more uniform is the deposit.

The same fact is apparent on the sand banks, as is shown by currents P, Q, R, and S, and if the Buba channel remains open it is solely due to the force and velocity of its current, which reaches almost 2 miles per hour.

In the section in front of Diana and Buba keys, between section B and E, there is an eddy when the tides change which lasts for one hour, due to the meeting of the two currents, one running out in the same direction as those of M and N, and the other running in by Diana Key, which cause the formation of the large banks marked out on this part of the study as shown by the transverse outline of the said sections at the side of Diana Key.

#### BLASTING.

The depth of the bed rock, as well as the nature of the materials that covered it, was ascertained by transverse lines of blastings, 1,000 feet apart longitudinally, with independent blastings 500 feet apart transversely. Samples from each one of the blasts from the lowest 8 feet alternately were obtained, and from the information collected it may be stated that the rock in the Diana channel is 25 feet below water, covered with a compact mass of argillaceous sand having an average thickness of 6 feet. The central shoal is all of argillaceous sand, having an average thickness of 13 feet, it being very compact near Diana Key and loose near Buba Key, which contrast is evidently due to the difference of the velocity in the adjoining channels. The Buba flats and shoals are formed by banks of extremely fine sand, and so compact that in two instances the blasting charge could not be placed at a greater depth than 2 feet. The open space to the north of the shoal, or, that is, of section I and L, shows a rock

bottom almost bare at a depth of from 18 to 20 feet, culminating in a space covered by blasts 59, 68, 70, and 61, where there are places at which rock is found at 17 feet. In the outlines of sections LL and N the accumulation of sediment deposited at the moments of impact and quietude of the currents from Hicacos and Stone Key on the north may be again observed, extending nearly from east to west, or, that is, in the direction of the Hicacos current, from its having greater velocity. Samples of material are forwarded with this report, it having been impossible to obtain more than one sample of the limestone that forms the bed from the apparatus having unfortunately been broken and our having been obliged to abandon these important experiments from lack of time to devote to them.

#### SELECTION OF CHANNEL.

The information obtained by this study seems to justify the selection of the Buba or leeward channel as the most advantageous and economical one. It is straighter, shorter, and easier to be kept clean, and from the estimate of the amount of earth to be removed is more economical in its first cost, and evidently so in its preservation.

In the selection of the course efforts have been made to combine the sections where the rock is at the greatest depth with those in which the deposit is least and the velocity and direction of the currents more favorable to a cheaper maintenance of the channel in good condition. The channel estimated for has a depth of 22 feet English at mean tide and a width of 150 feet. With the said dimensions and the establishment of an adequate line of buoys all vessels trading with Cardenas may pass through it as far as La Poza. In the general plan the course of the selected channel is marked out and separately there is sent herewith a longitudinal outline of the same for greater clearness. The channel study has a length of 19,500 feet, commencing from a point of depth of water to the south of Buba and Diana keys until it ends in 27 feet depth to the north of section O; and from the estimates as to the amount of material to be removed it appears that 54,770 cubic meters of different kinds of sand and 46,474 cubic meters of limestone will have to be taken out.

With the aforesaid data contained in this report and taking into account the action of the currents at Hicacos and Diana, the excavated materials should be deposited either in the channel that separates Diana Key from Chalupa Key and in this manner diminish the effect of the Hicacos current; or deposited on the shoals to the north of Diana Key, inasmuch as it is apparent that the general tendency at that part is toward concentration there of the deposits, and therefore there would be no fear that excavated material deposited there would be carried elsewhere. No estimate has been made for breakwaters, from its having been considered prudent to await until the channel was dredged in order to estimate with more preciseness the effect of the different currents that cross it and then apply the proper remedy.

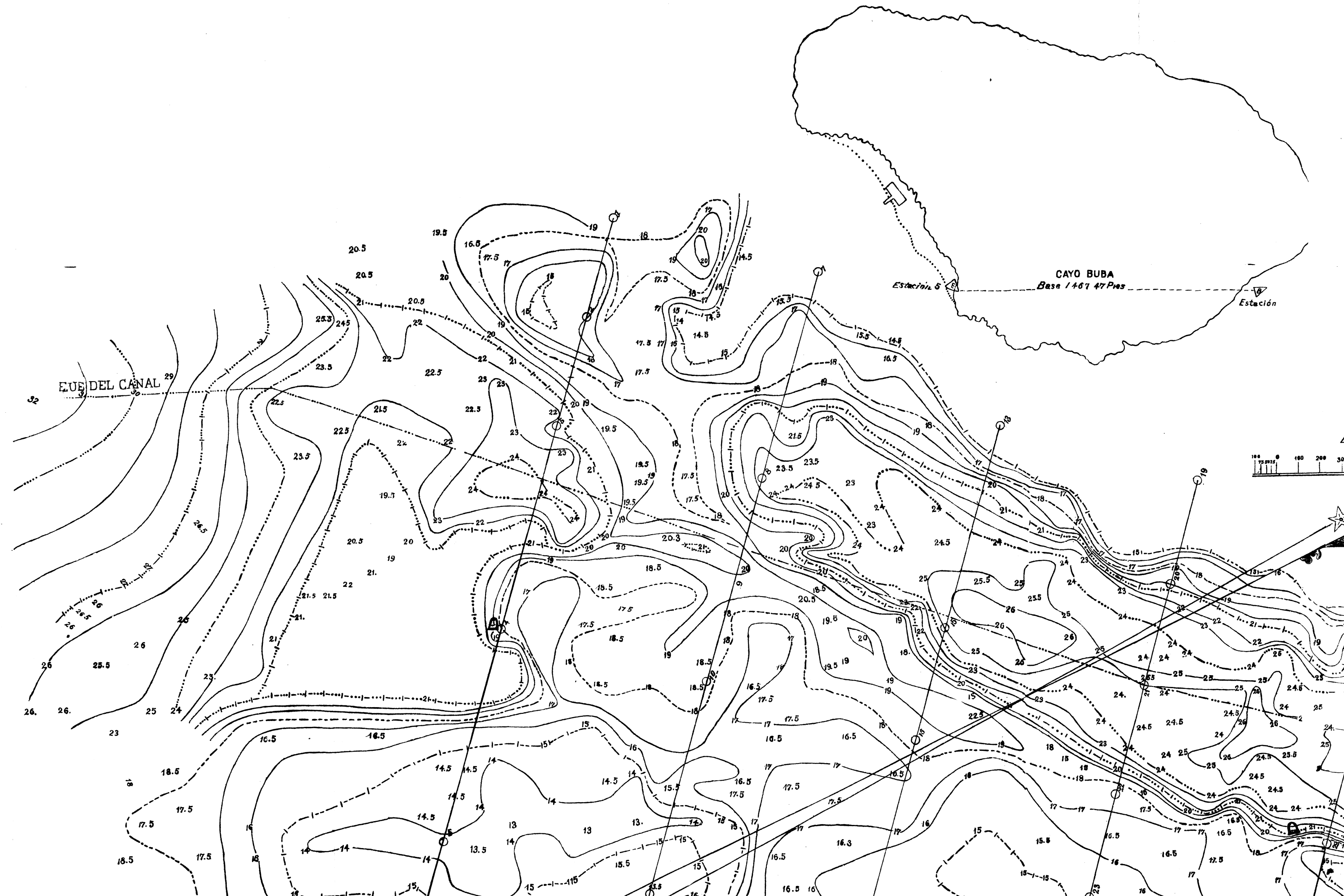
The work of dredging the Buba channel amounts to \$300,752, distributed as follows:

#### *Estimates of the work.*

54,770 cubic meters of sand excavated and transported, at \$0.40 .....	\$21,908
46,474 cubic meters of rock, at \$6 .....	278,844
Total .....	300,752

This report is accompanied by the following documents and plans:

1. Data relating to the observation of currents and diagram.
2. Data referring to blasting.
3. Estimates.
4. Old plan of the bay of Cardenas. (Adapted.)
5. Plan comprised by this study of the bay of Cardenas with lines of level.
6. Plan comprised by this study of the bay of Cardenas showing the study of currents.
7. Longitudinal outline of the Buba channel. Cross sections of the survey over the sections of the blasting lines.
8. Variations of tide.





# PLANO DEL ESTUDIO

PARA

## EL DRAGADO DE LA ENTRADA

AL PUERTO DE

# CARDENAS

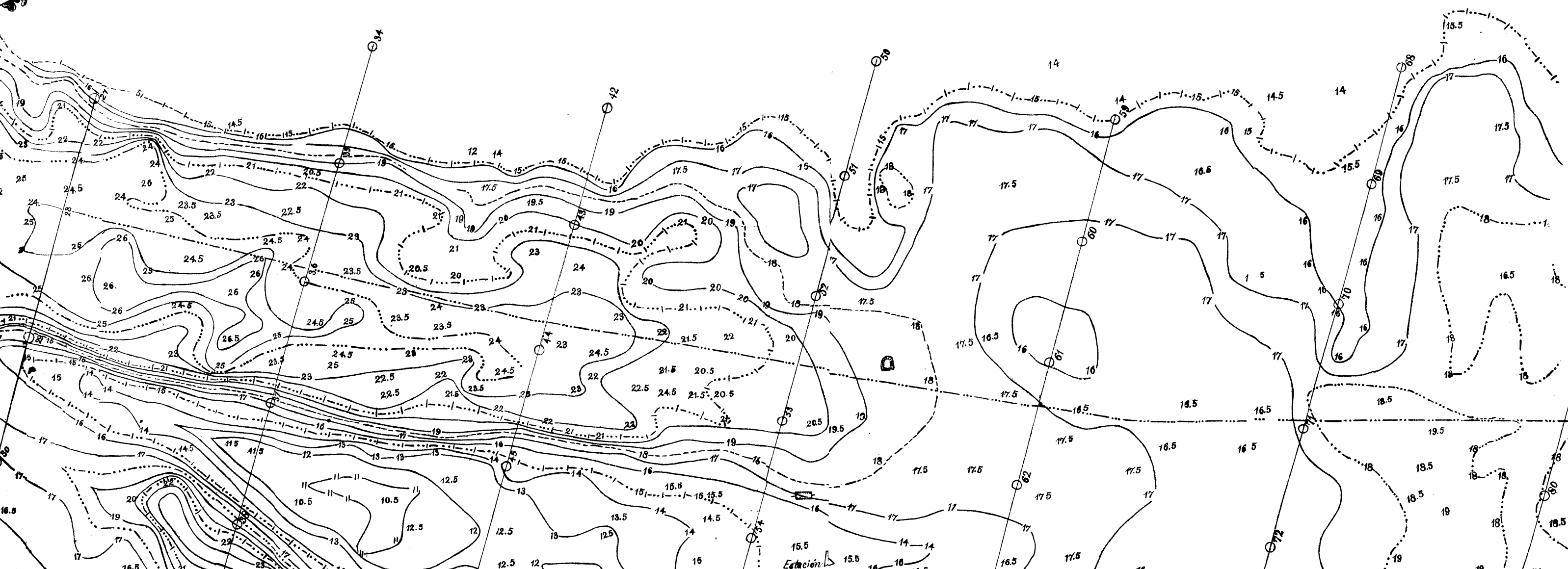
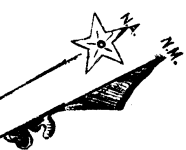
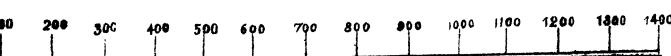
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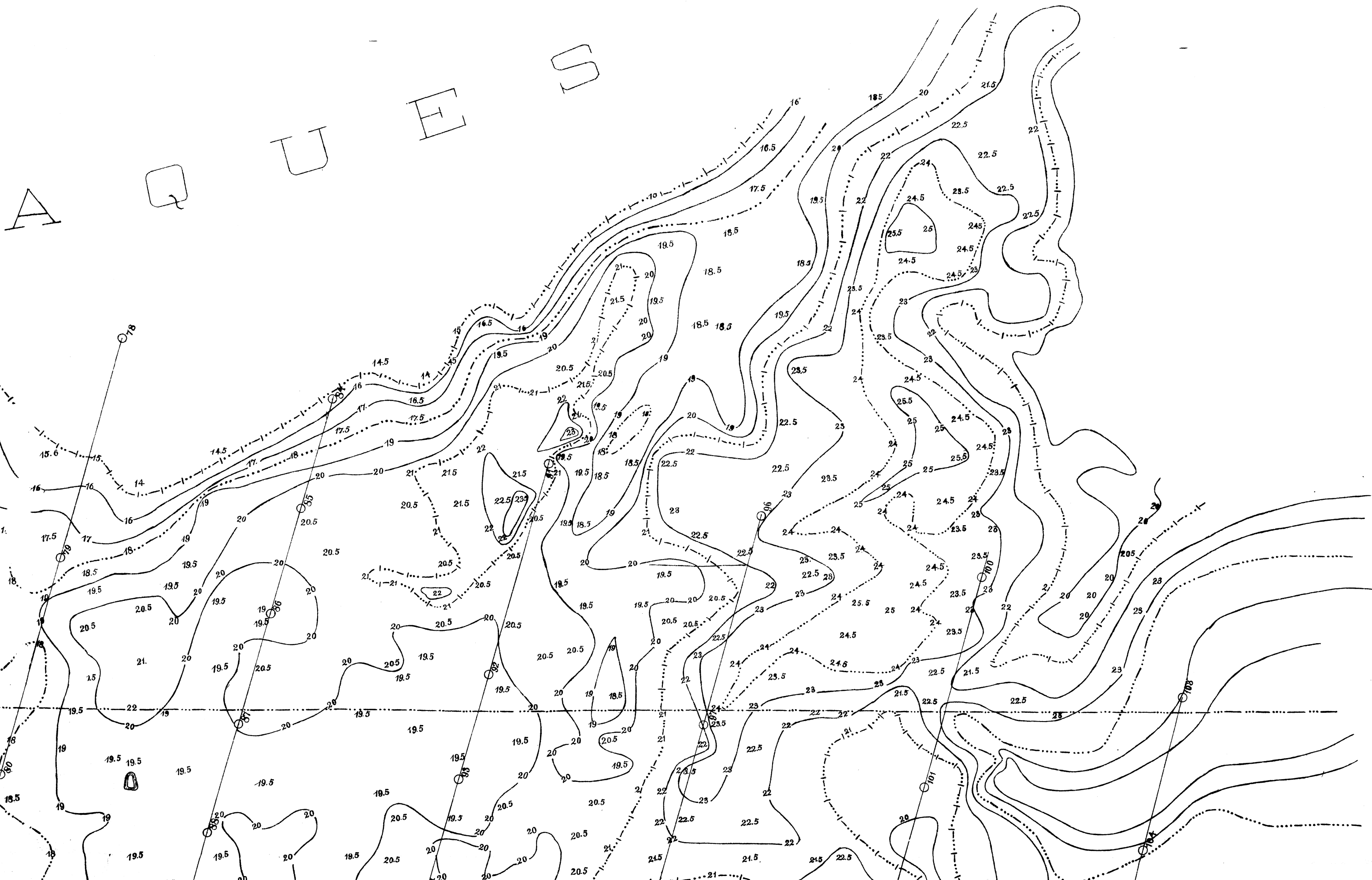
Cardenas 30 de Abril de 1900.

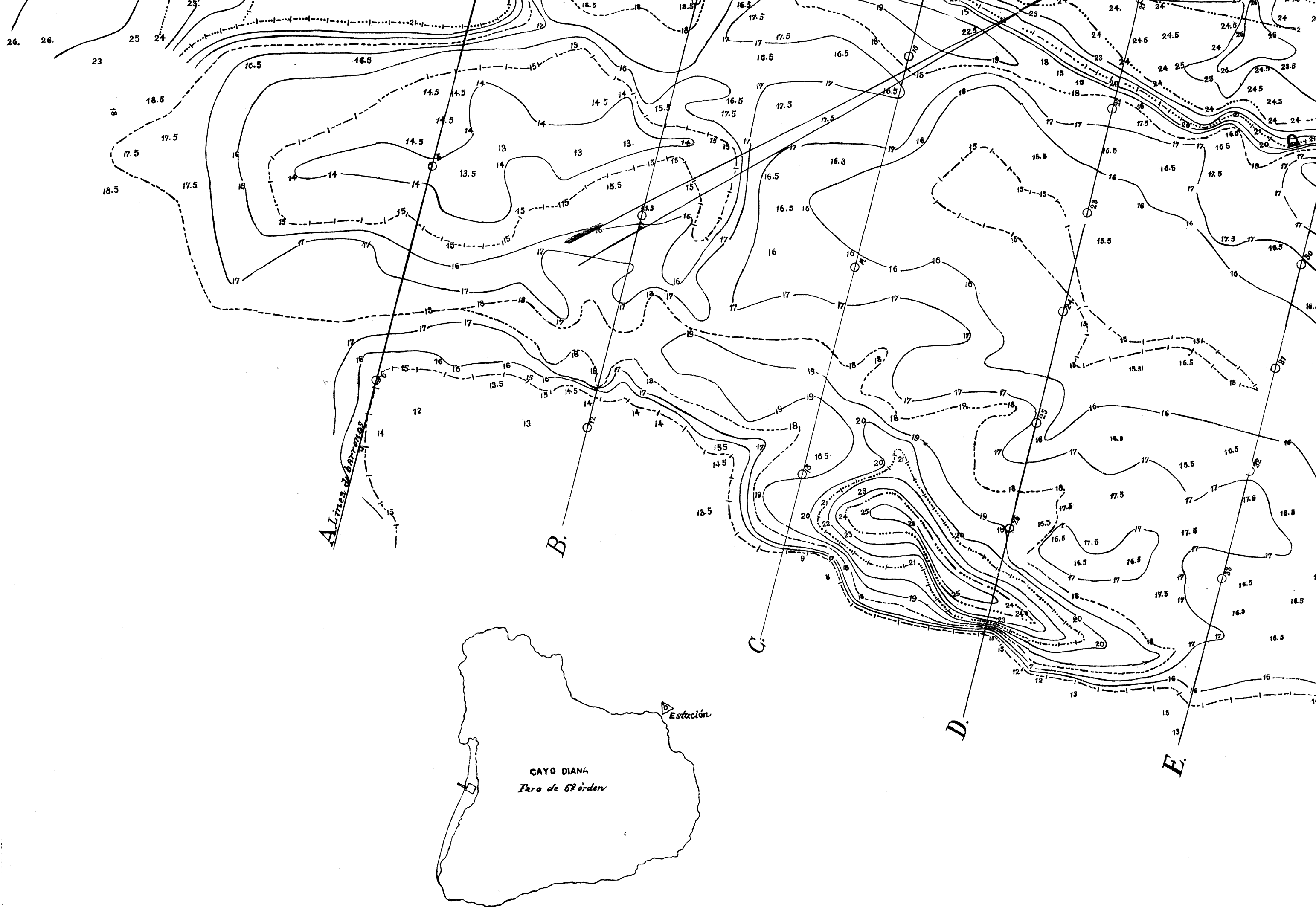
EL Ingeniero  
Miguel Chalmers

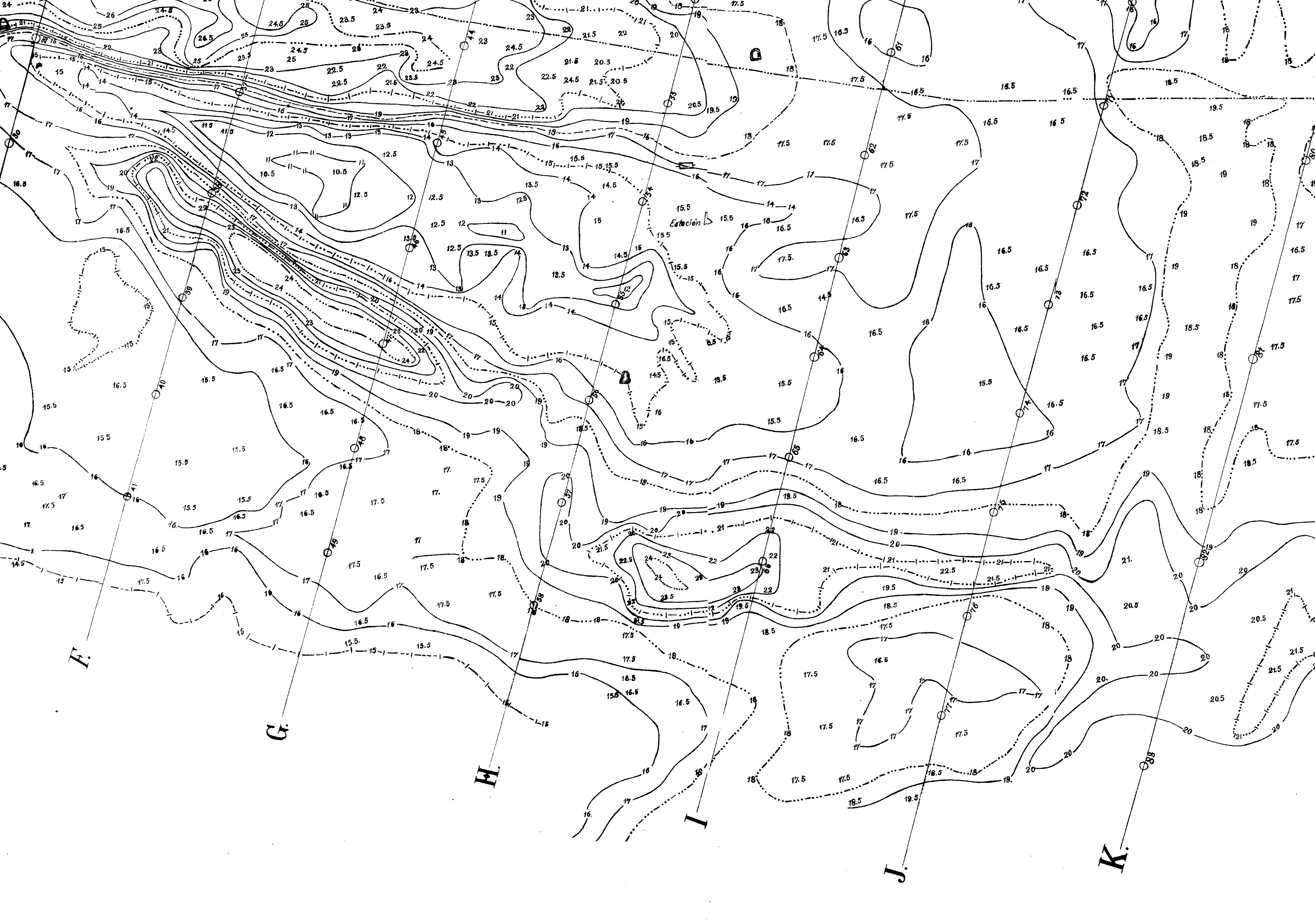
Estación 

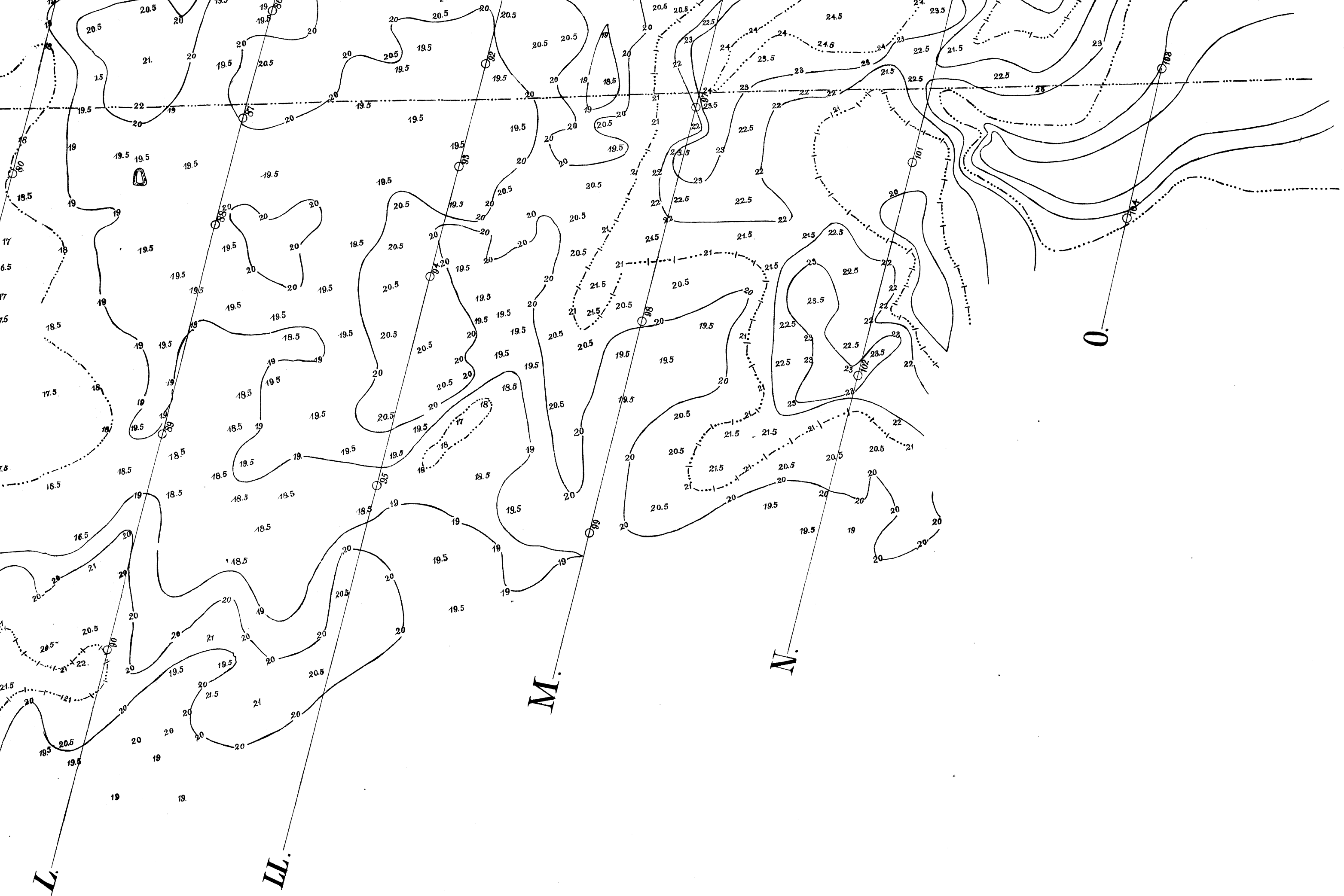
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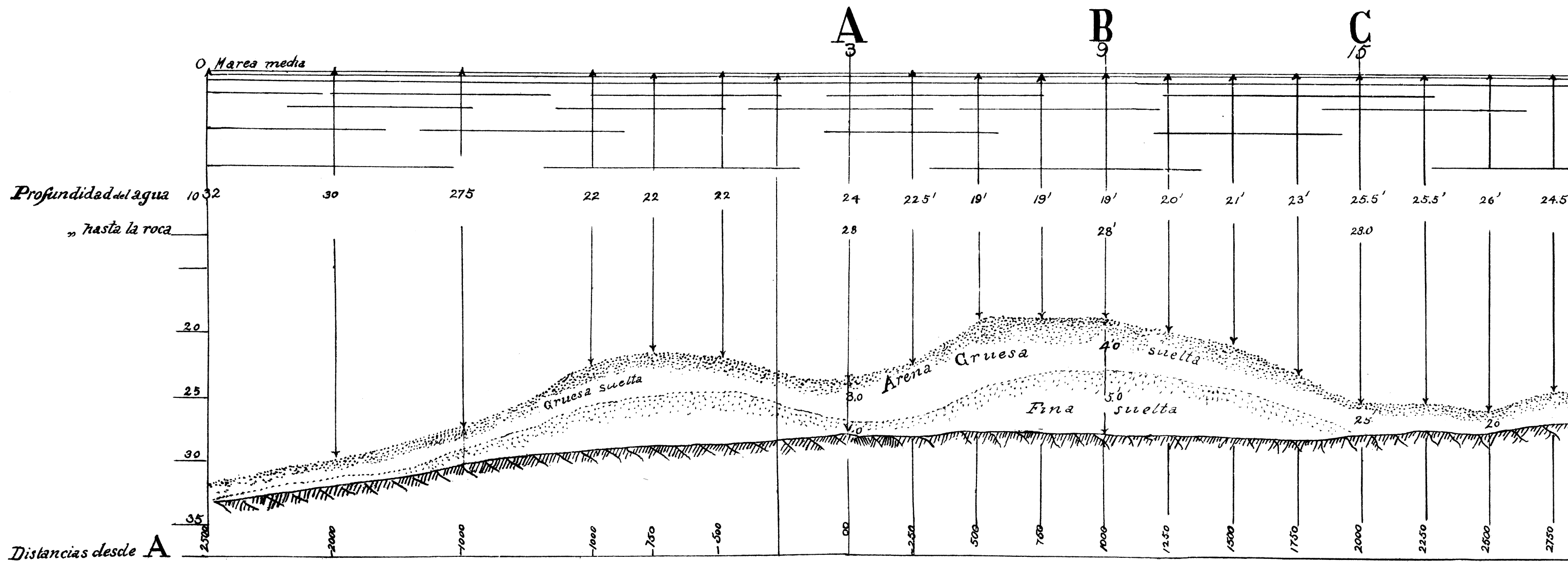












Contrata al Puerto de Cardenas  
Perfil longitudinal

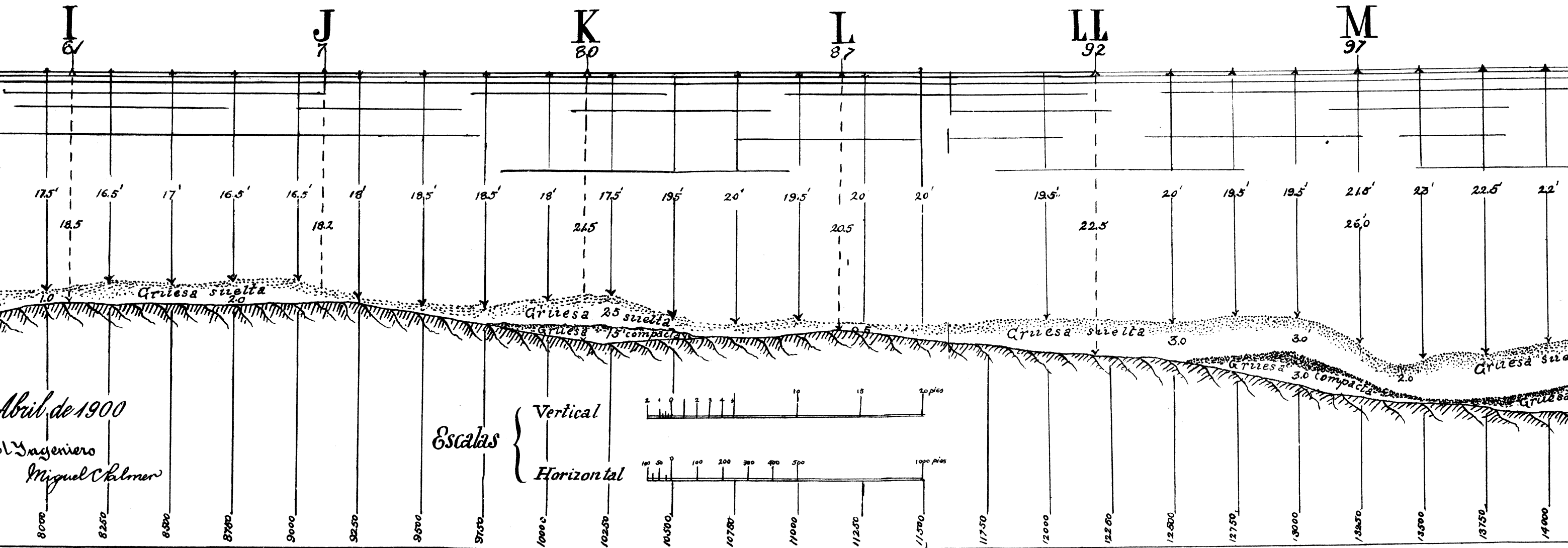


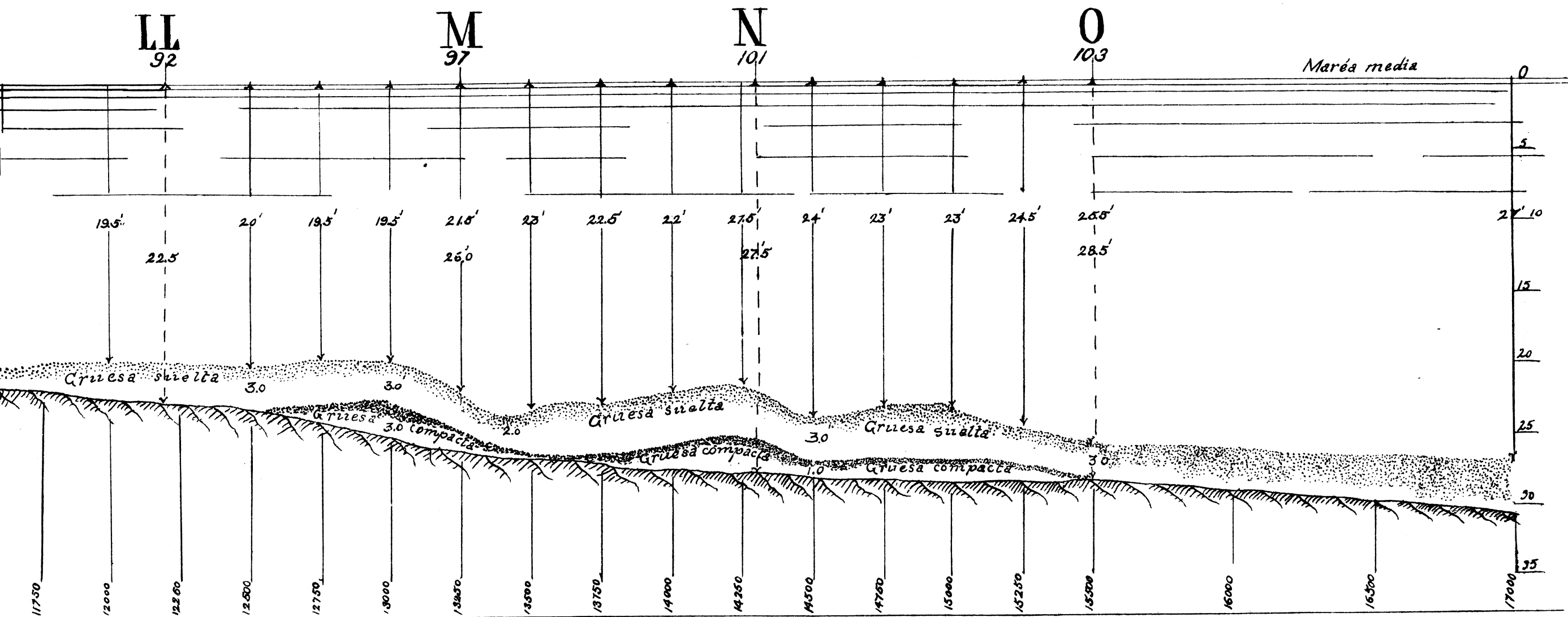
El Yagenero  
Miguel Chalmer



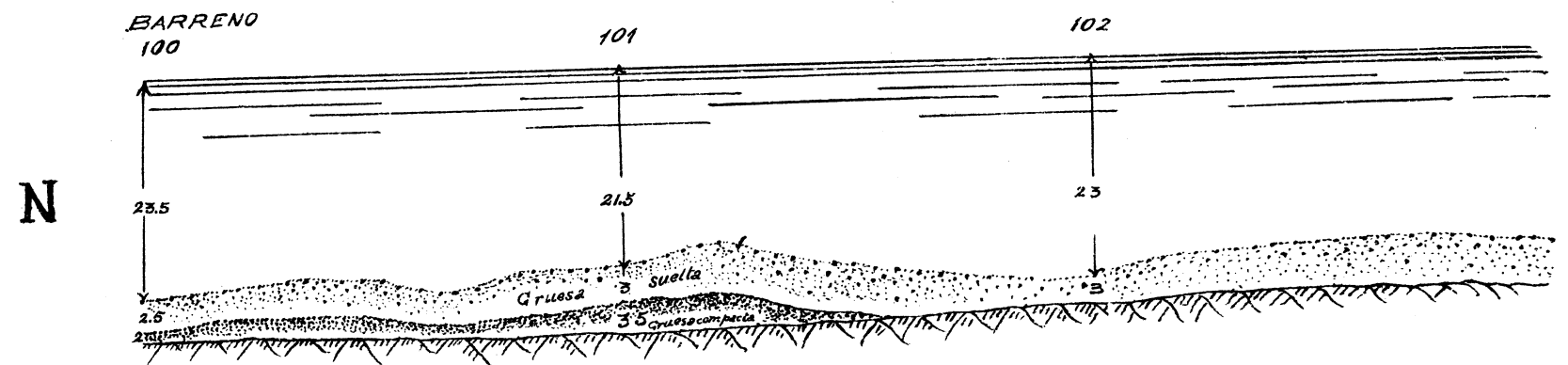
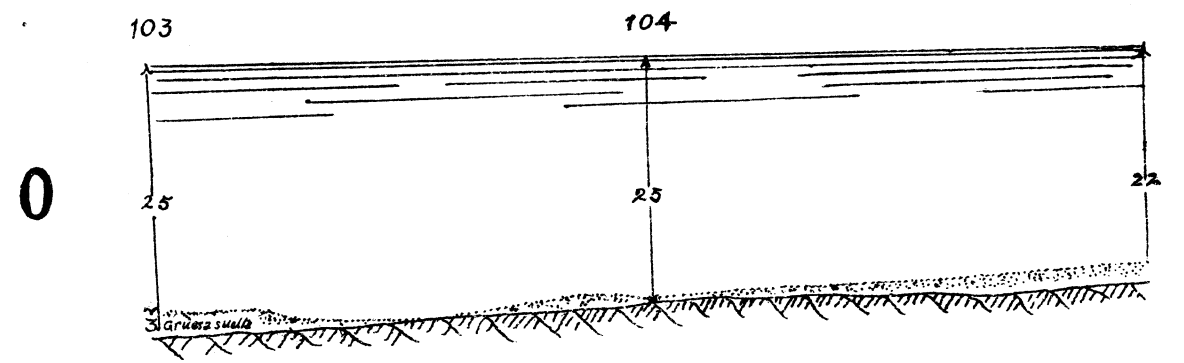
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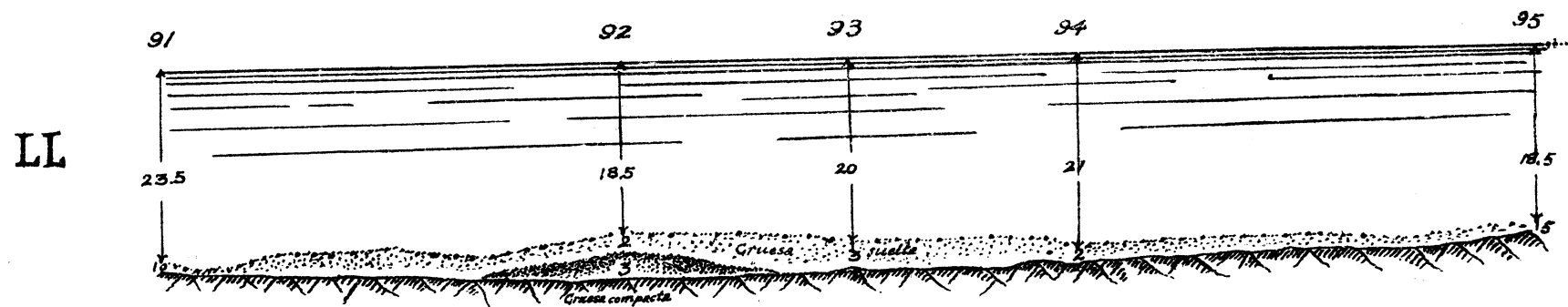
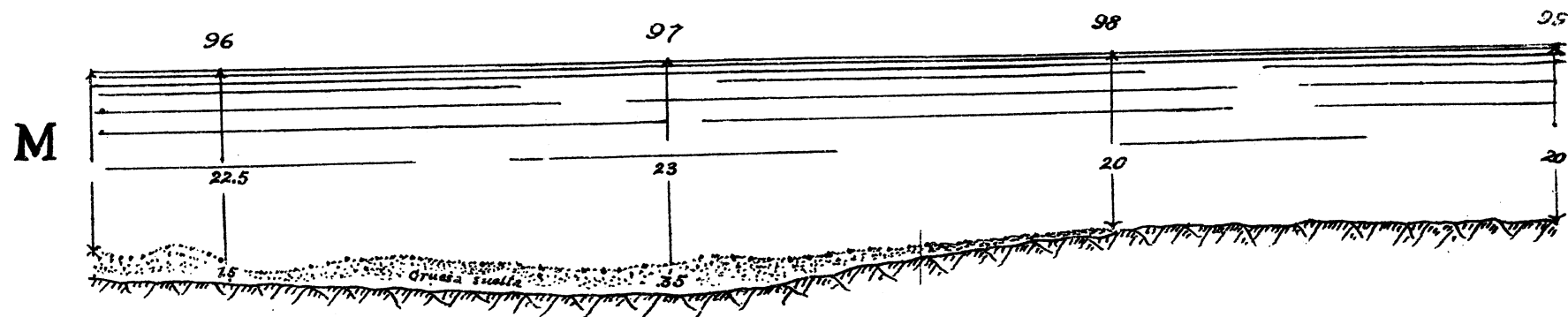
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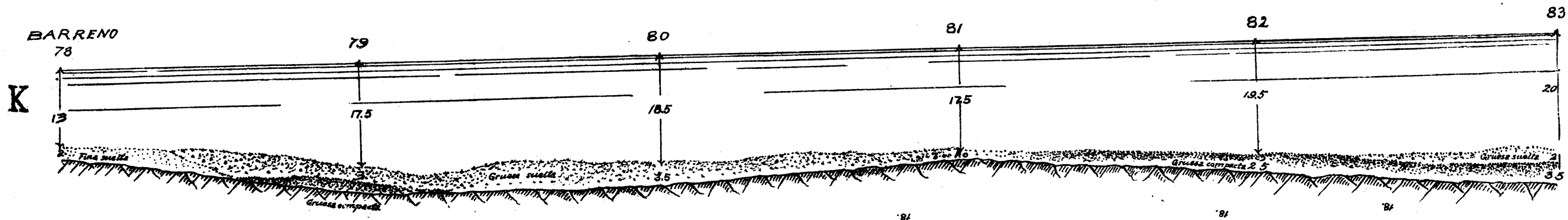
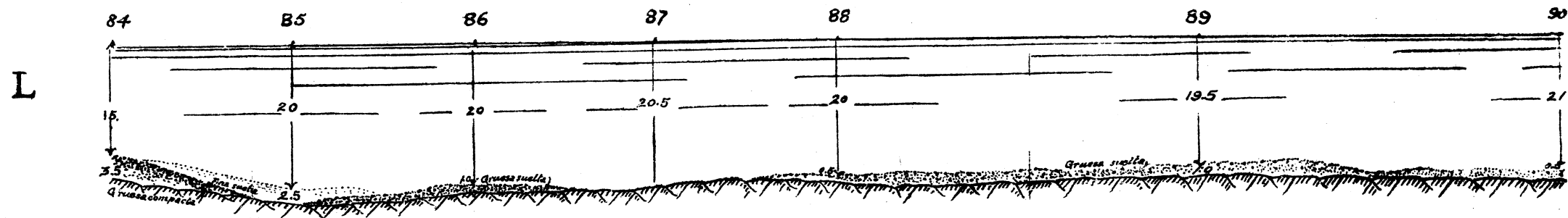


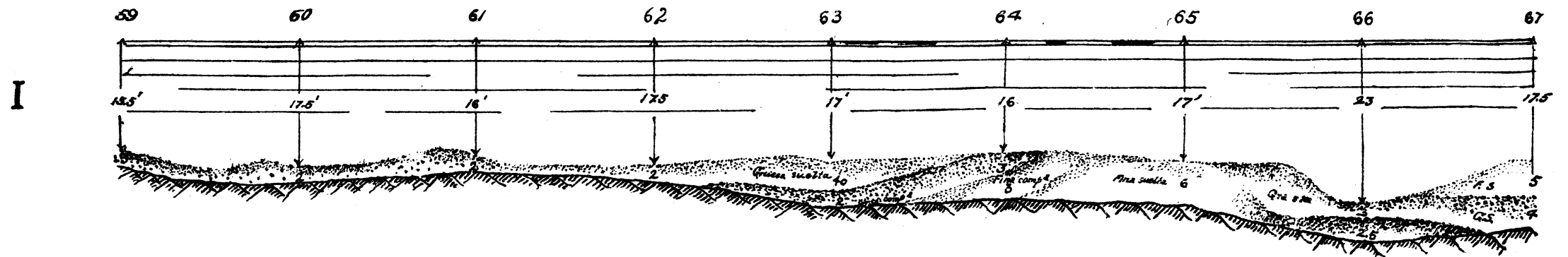
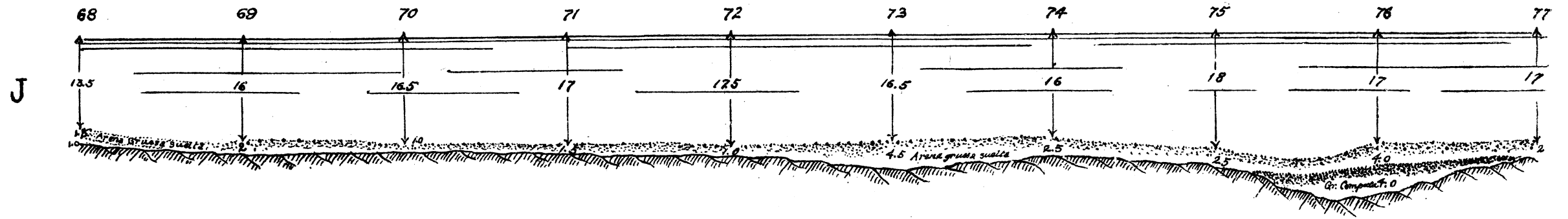




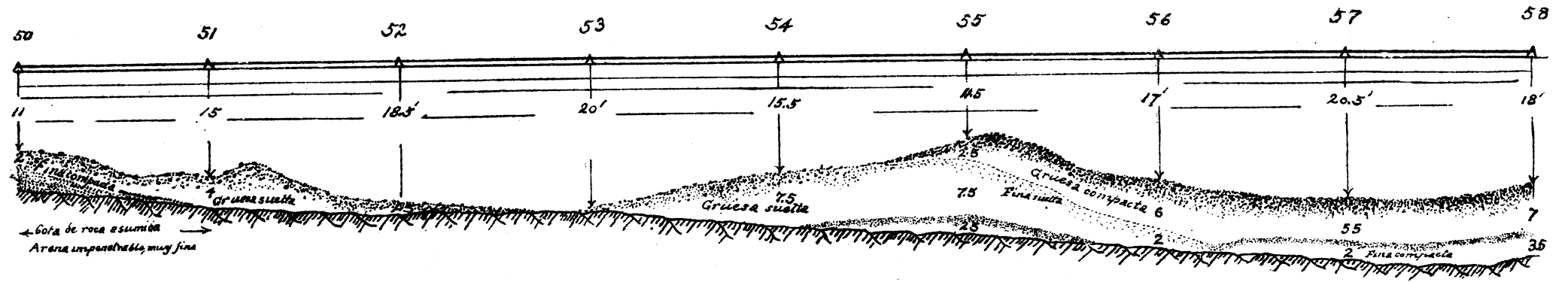




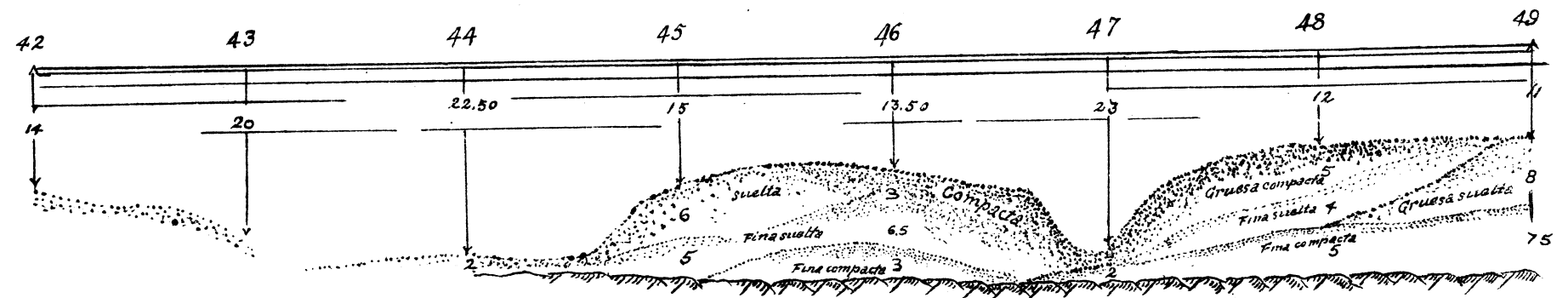




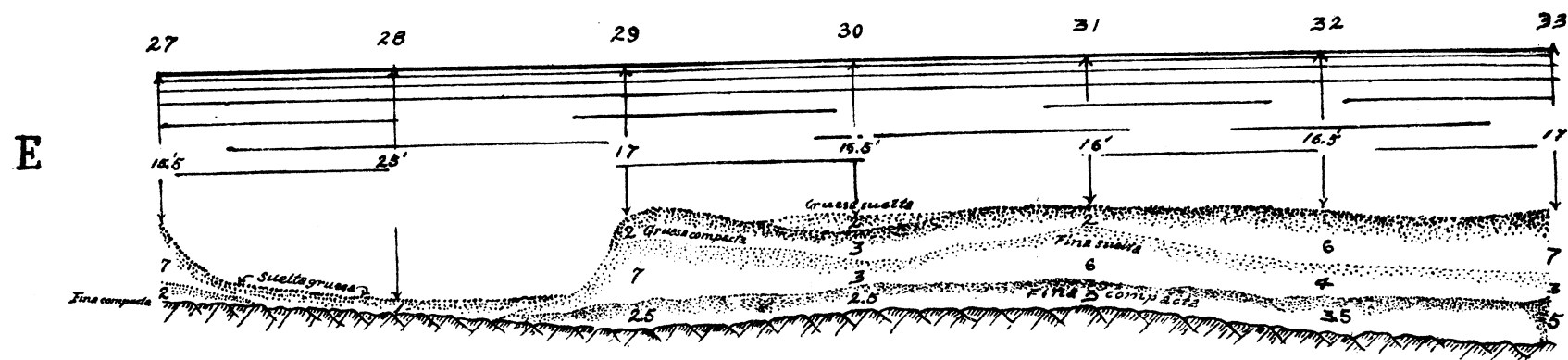
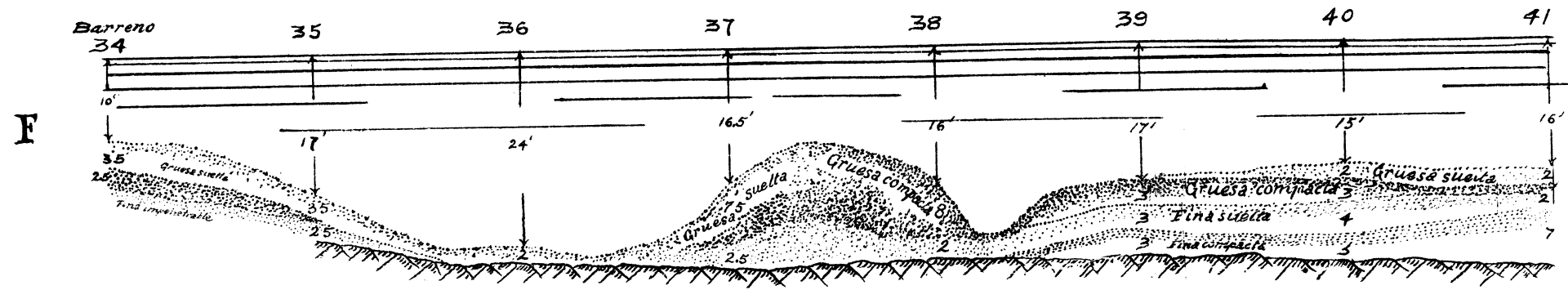
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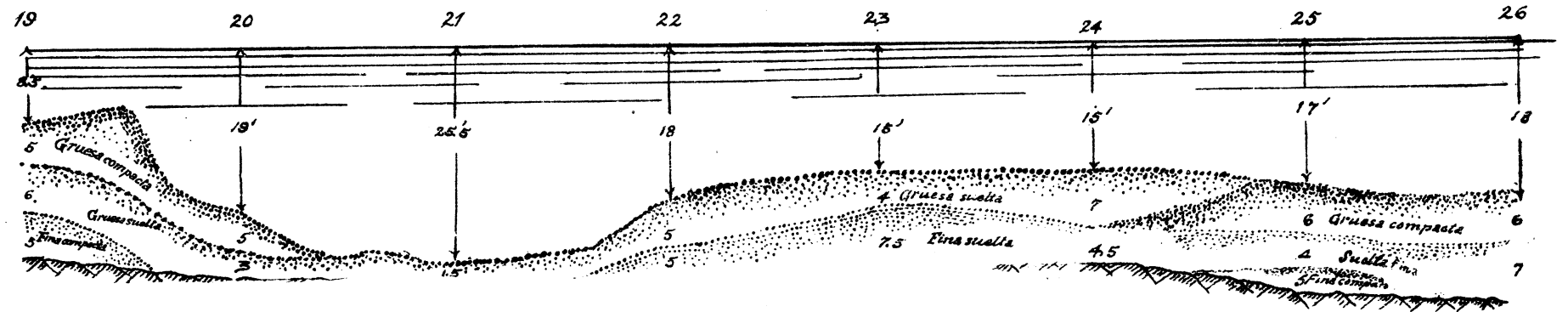
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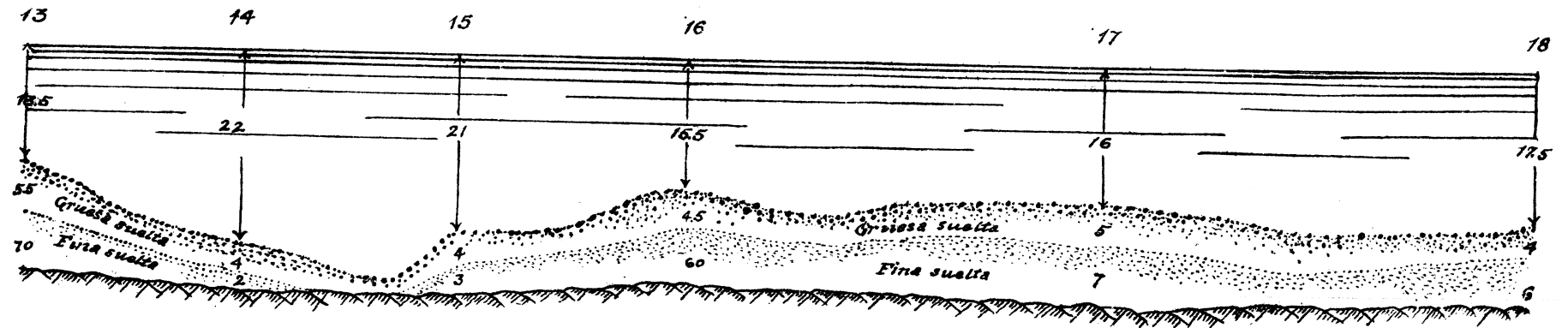




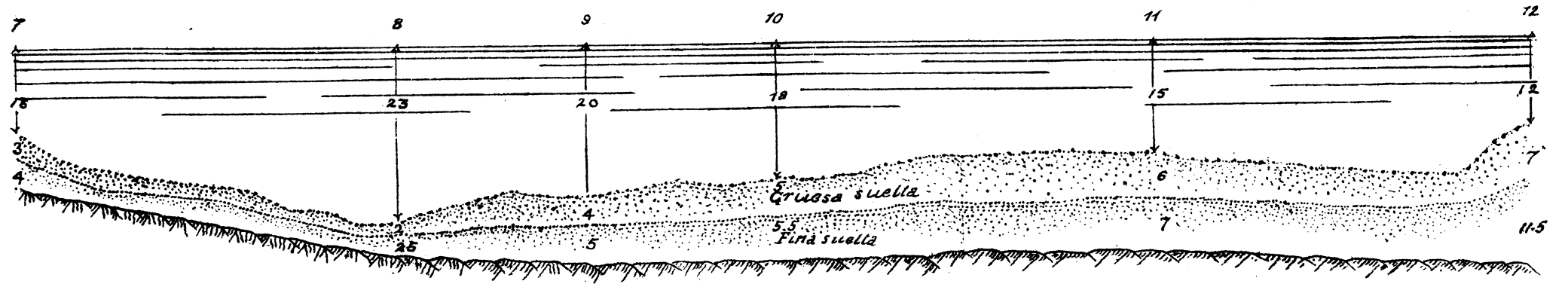
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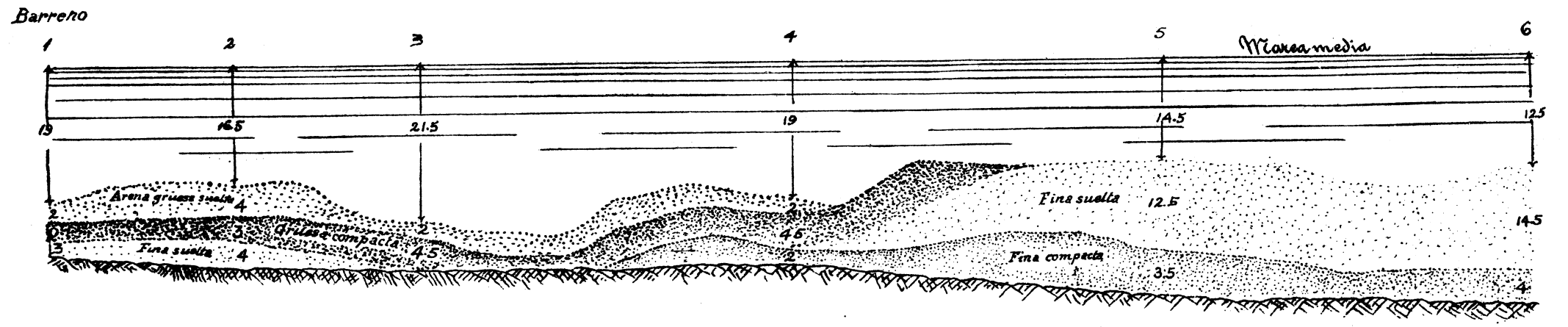
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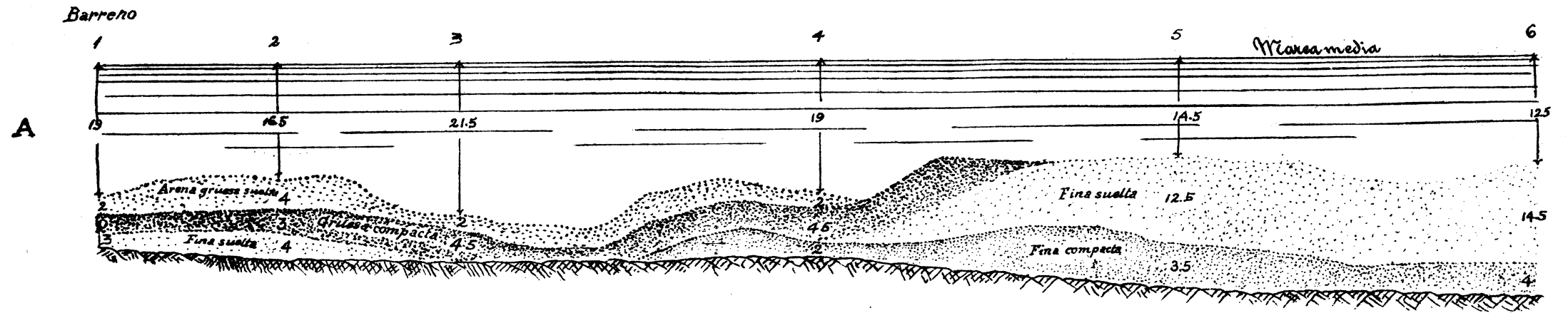


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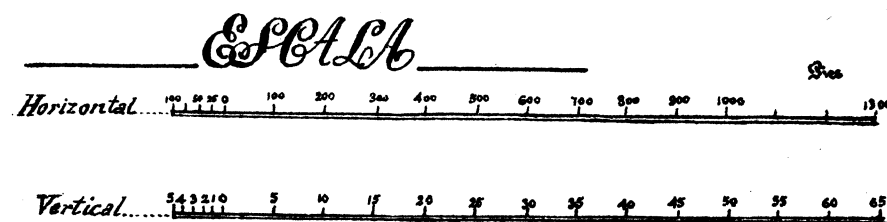




# Perfiles transversales

de  
Los Canales de entrada  
al  
Puerto de Cárdenas

Matanzas, Abril 30 de 1900



Ingeniero encargado  
Miguel Salmerón



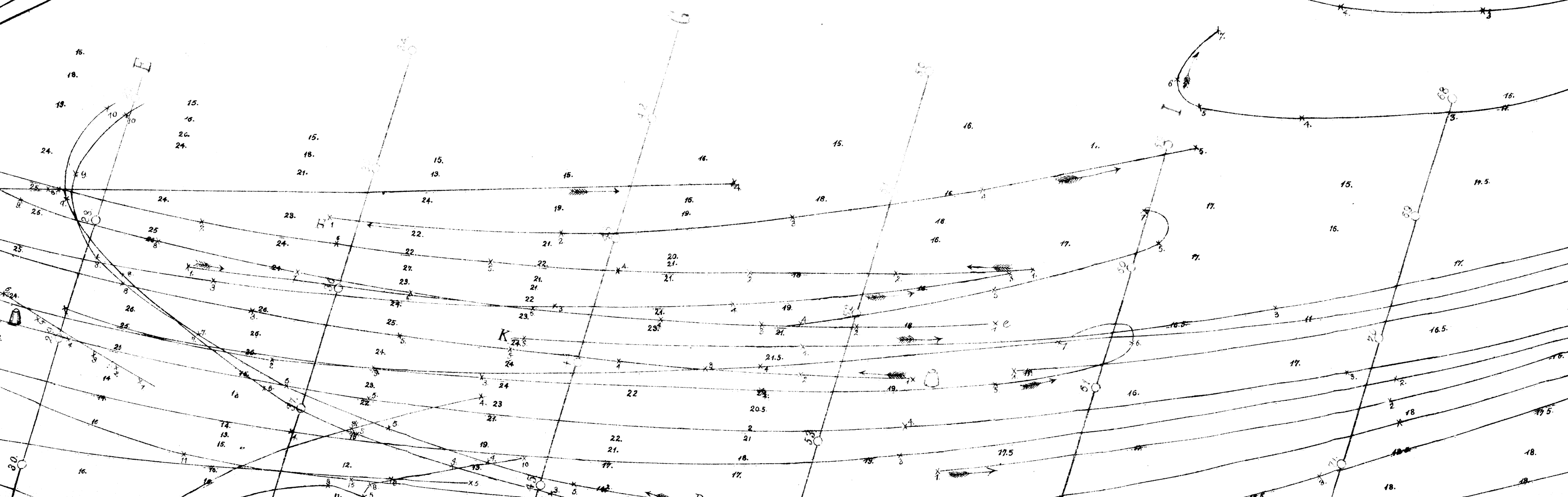
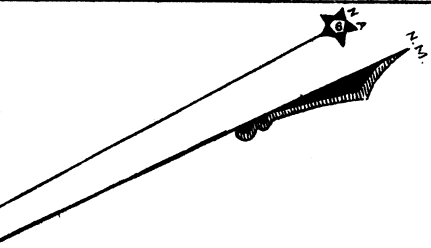
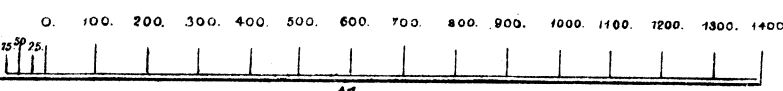




Plano del Estudio  
*mejoramiento*  
El Dragado de la Entrada  
*completa*  
Puerto de Carmona

Cardenas 30 de Abril de 1900.  
El Ingeniero  
Miguel Calmer.

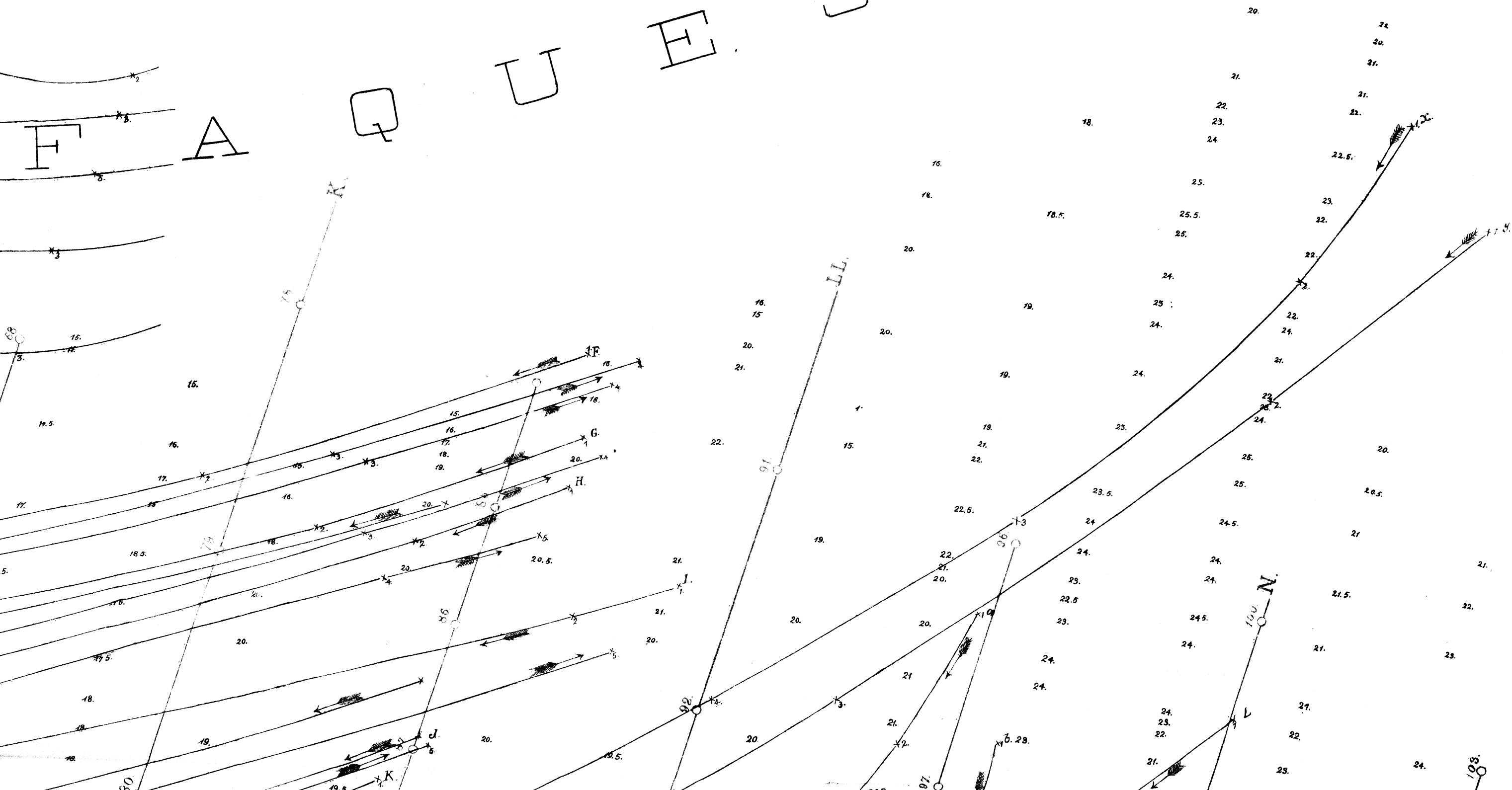
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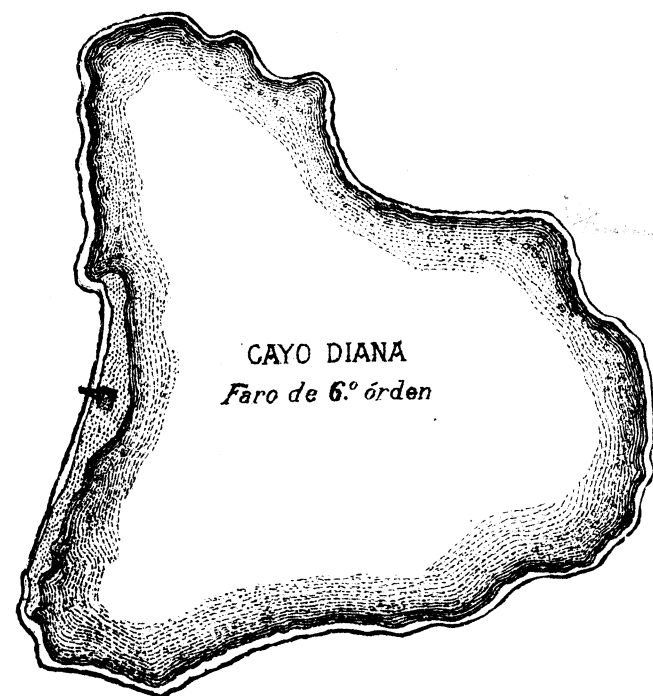
A

L F

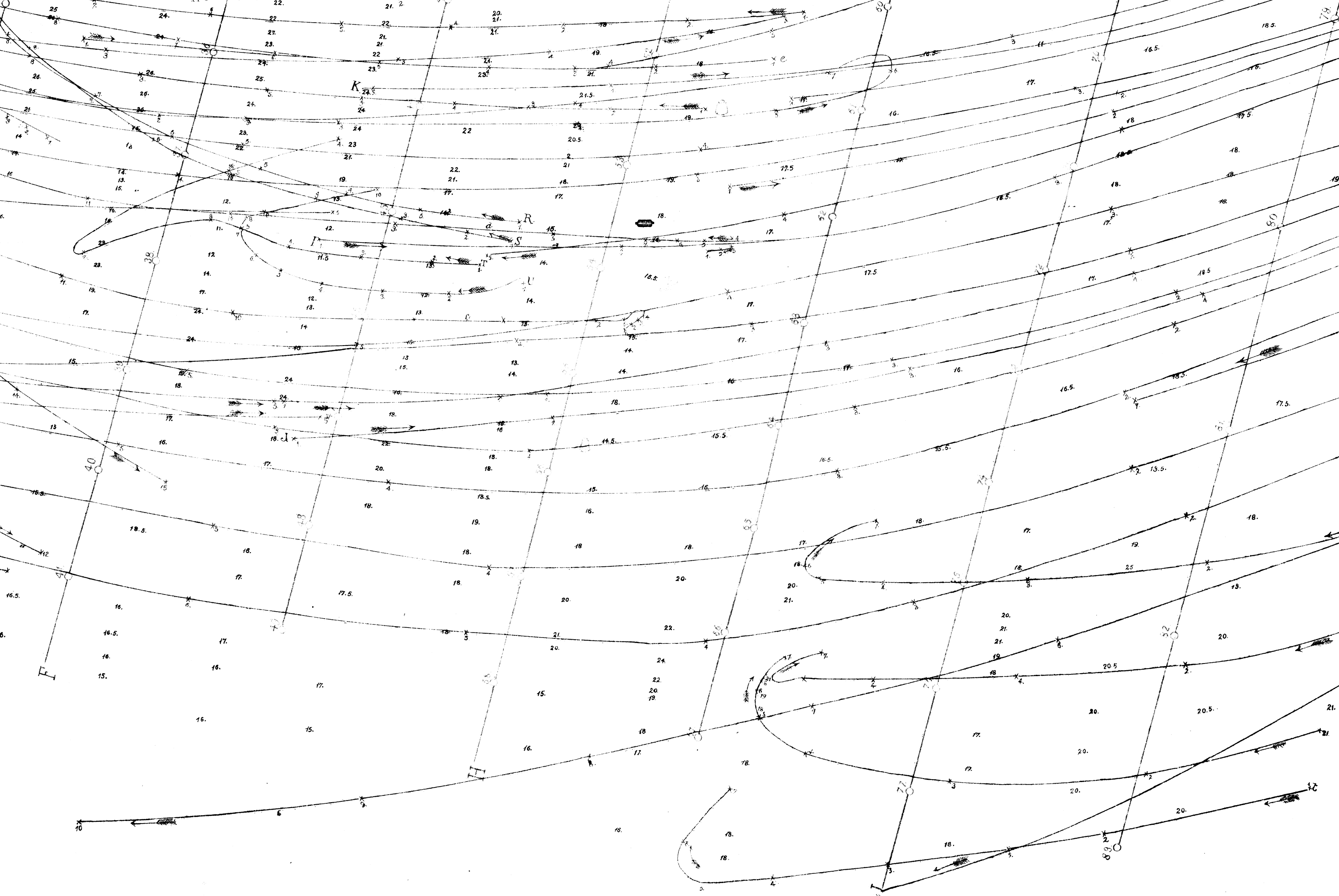
FAQUES

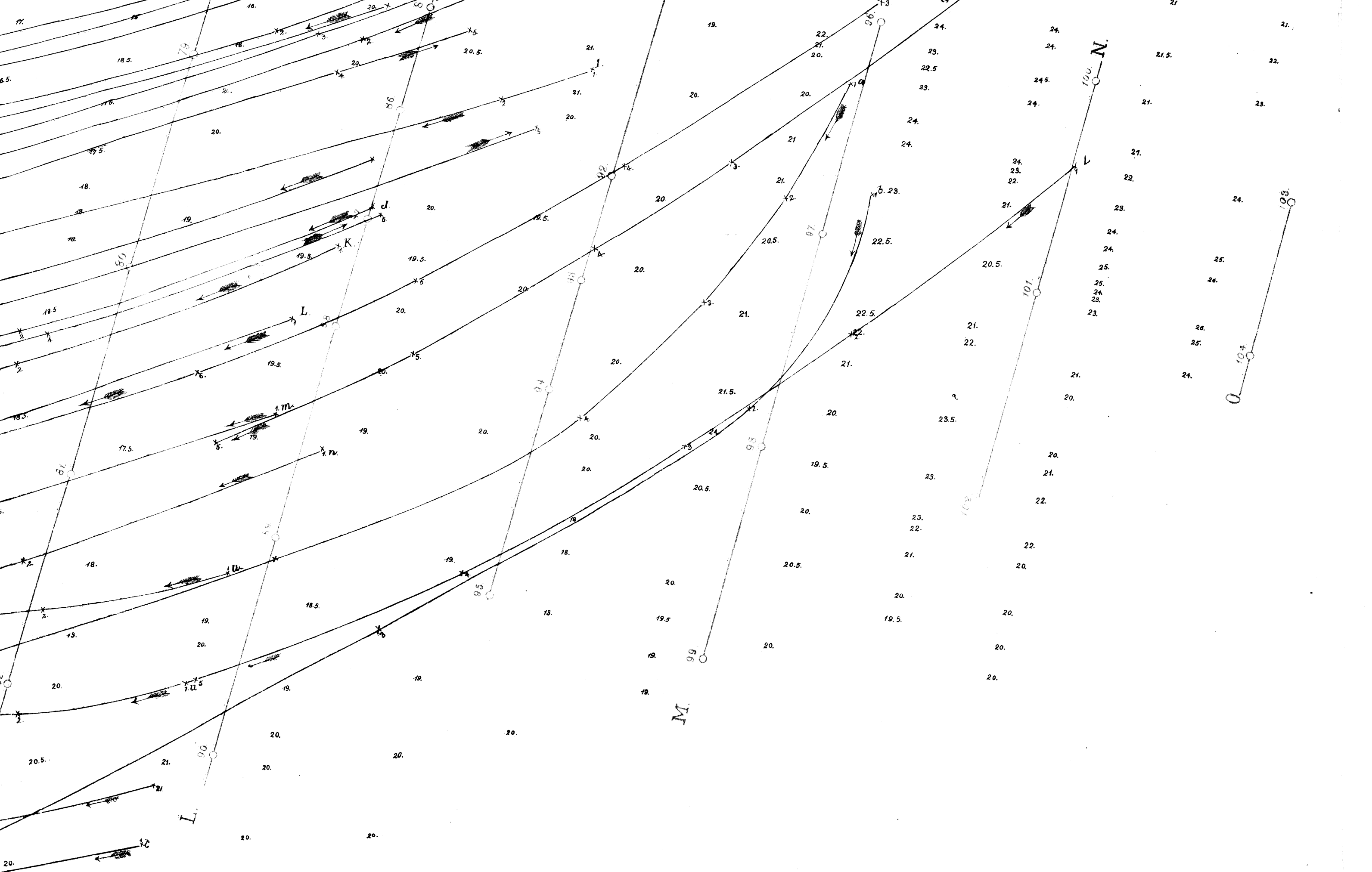




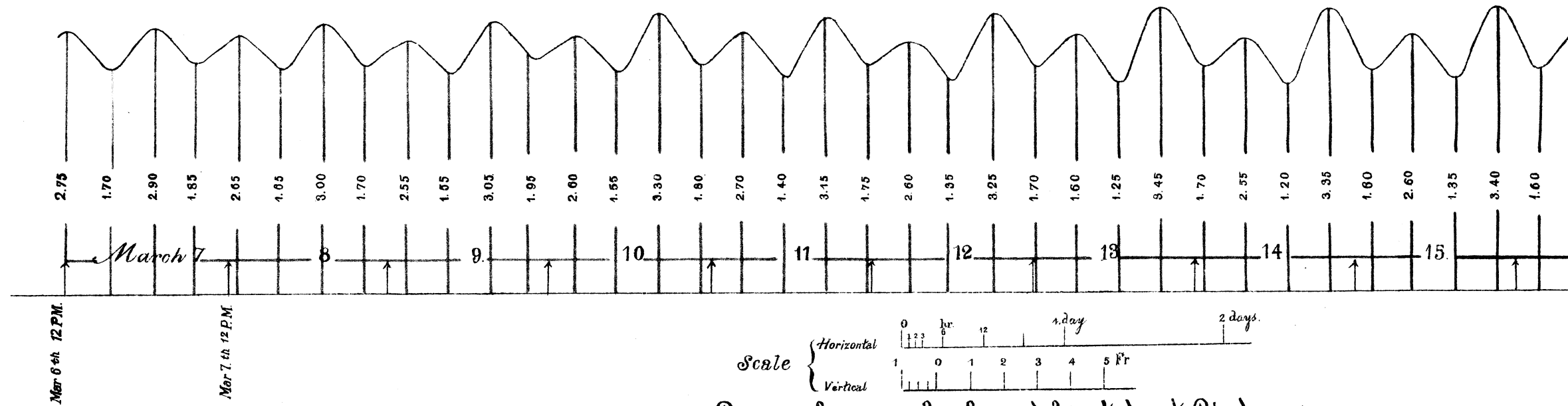


CAYO DIANA  
*Faro de 6.º orden*



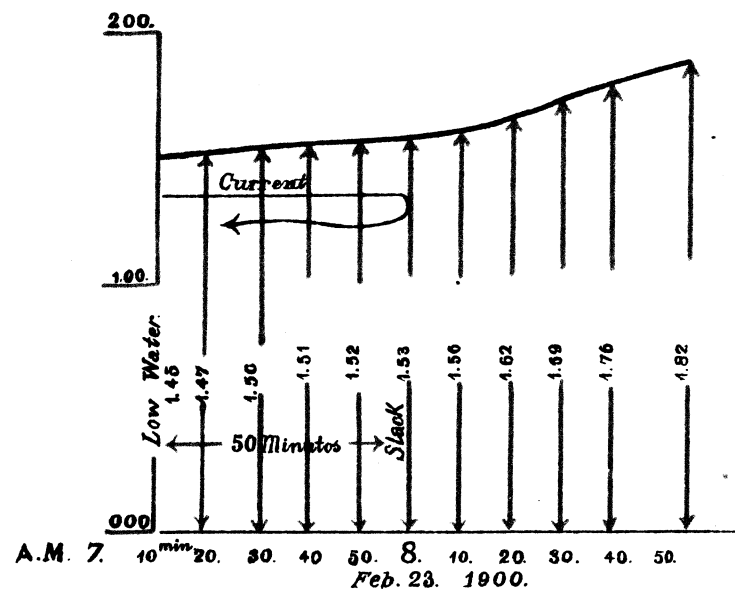




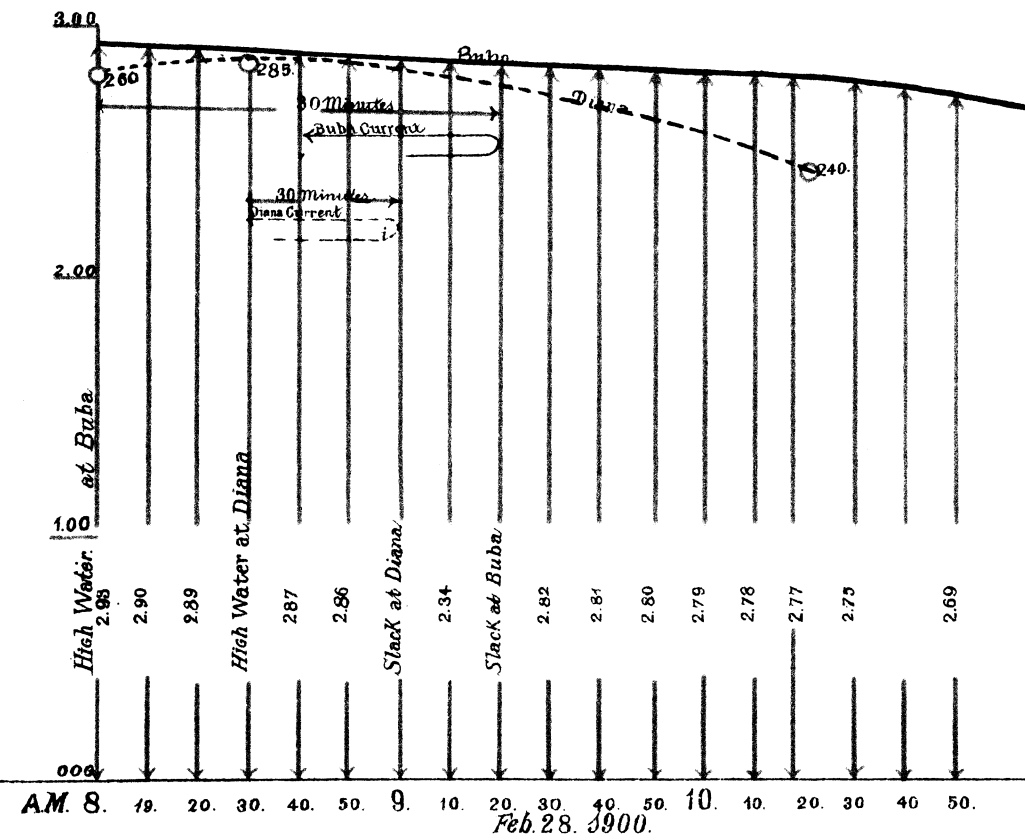


Curve showing high and low tide at Cardenas  
March 1900.

Cardenas 30<sup>th</sup> April 1900.  
Engineer in charge  
Miguel Palmer



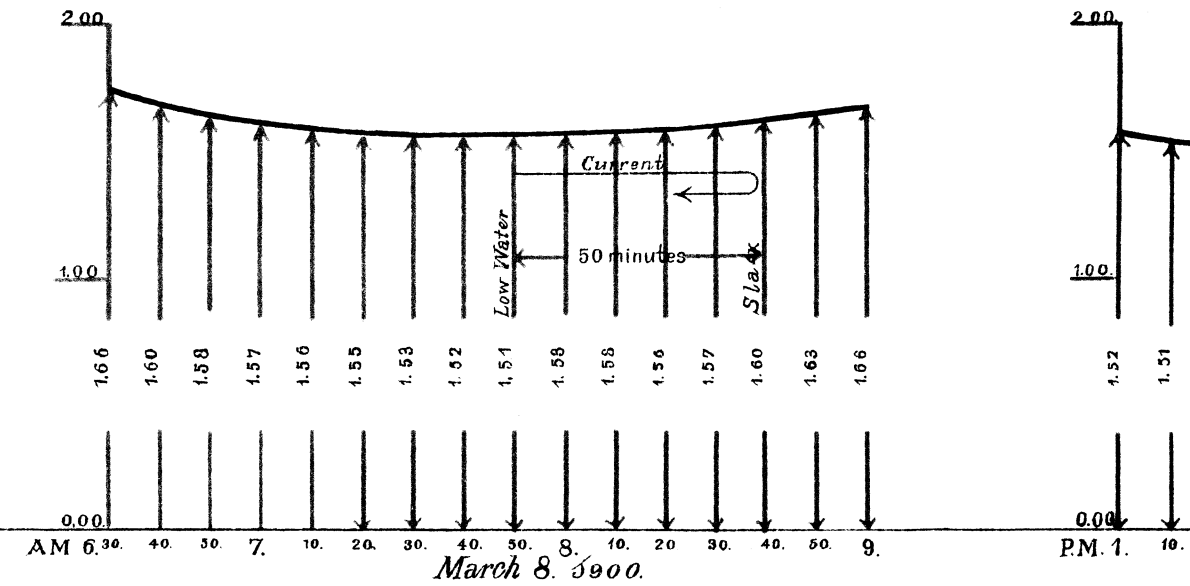
Buba Channel between Sections A.C.



Full lines along Buba Channel between Sect E.C.

Dotted " " Diana " " " "

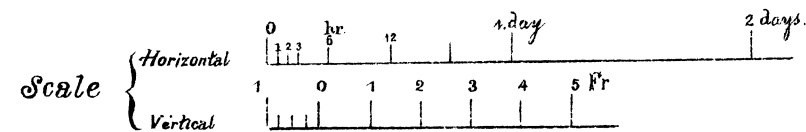
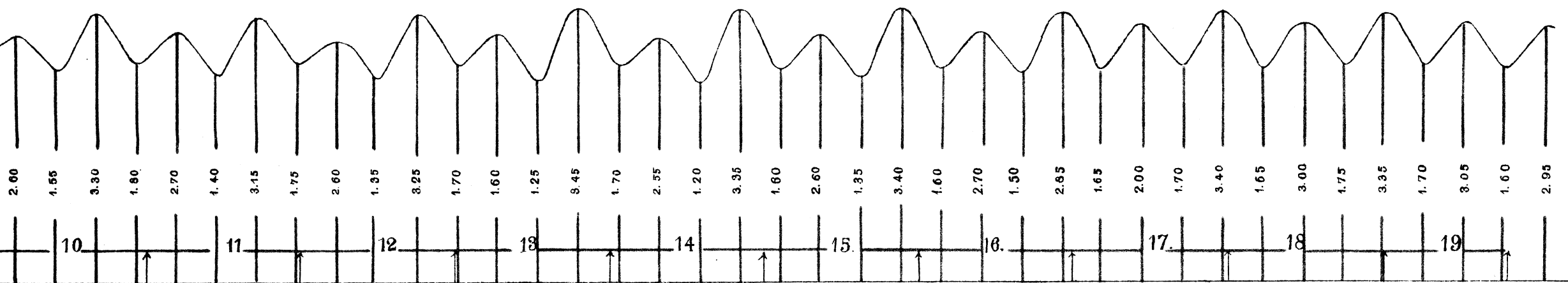
See currents R.S.T.U.



Diana Channel between Sect B.F.

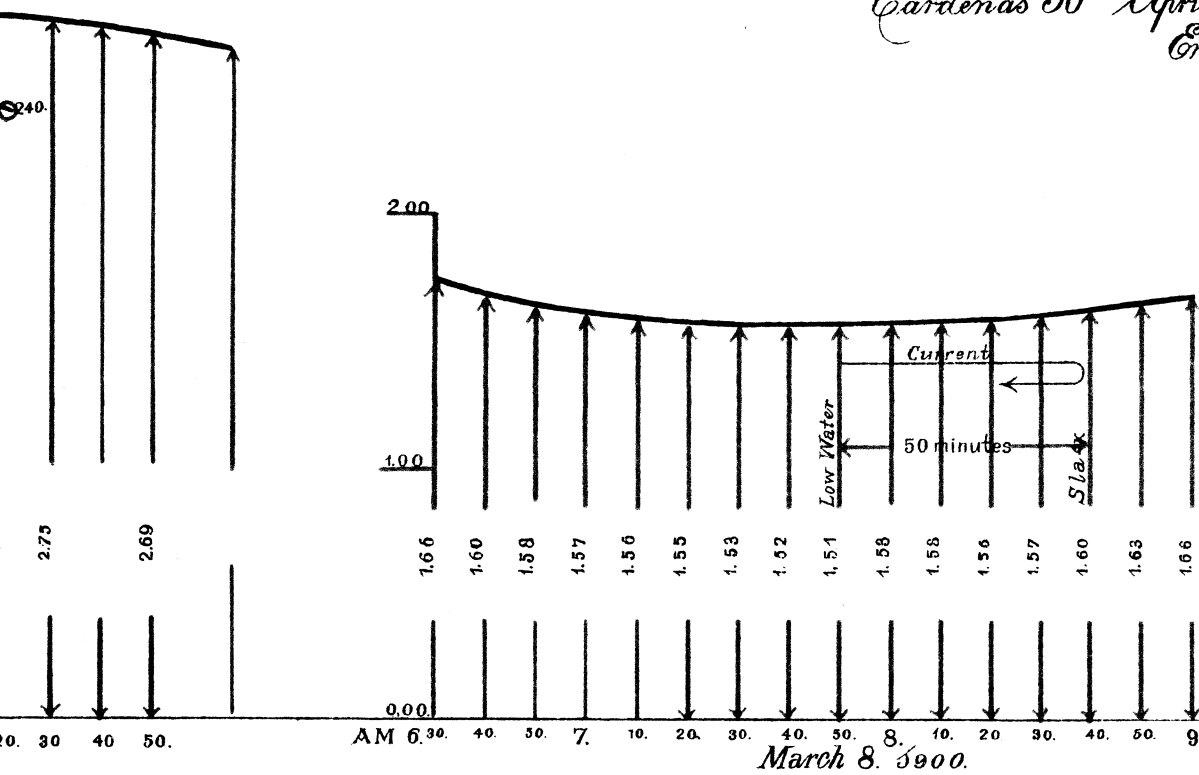
See currents M.N.

Curves showing intervals between high, low and slack tides at entrance to Cardenas

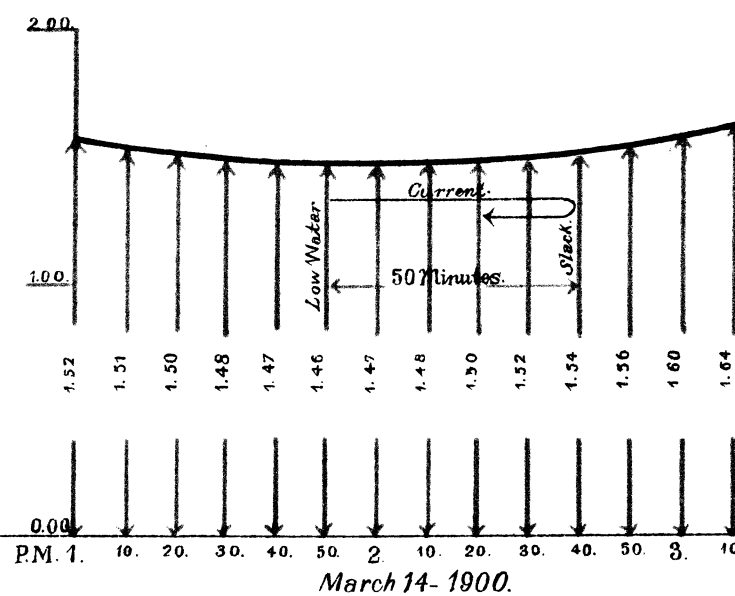


Curve showing high and low tide at Cárdenas  
March 1900.

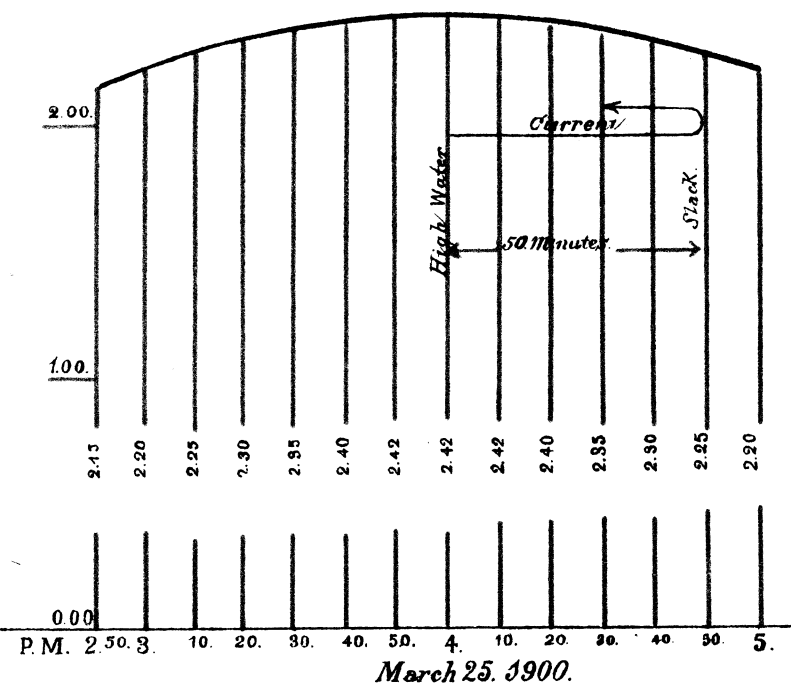
Cárdenas 30<sup>th</sup> April 1900.  
Engineer in charge  
Miguel Palmer



Diana Channel between Sect. B. F.  
See currents M. N.



Buba Channel between Sect. G. J.  
See currents P. Q.



Alfaques Sect. G. to K.  
See currents p q r s.

Intervals between high, low and slack tides at entrance to Cárdenas Harbor.



*Estimate for channel 22 feet deep at mean tide and 150 feet wide.*

Distance to starting point.	Length.	Areas.		Volumens.	
		Sand.	Rock.	Sand.	Rock.
2,500					
250	2,500				
500	250	38		4,750	
750	250	562		75,000	
1,000	250	356		114,750	
1,250	250	366		90,250	
1,500	250	347		89,125	
1,750	250	165		64,000	
2,000	250	20		63,125	
2,250				2,500	
2,500					
2,750					
3,000					
3,250					
3,500					
3,750					
4,000					
4,250					
4,500	2,500				
4,750	250				
5,000	650				
5,500	100	30		1,500	
5,750	250	20		6,250	
5,800	50			500	
6,500	700				
6,750	250	40		5,000	
7,000	250	75	75	14,375	9,375
7,250	250	150	190	28,125	33,125
7,500	250	210	150	45,000	42,500
7,750	250	190	480	50,000	75,000
8,000	250	95	600	35,625	131,250
8,250	250	260	525	44,375	140,625
8,500	250	190	600	56,250	140,625
8,750	250	225	600	51,875	150,000
9,000	250	225	600	56,250	150,000
9,250	250	150	440	46,875	130,000
9,500	250	150	375	37,500	101,875
9,750	250	300	265	56,250	80,000
10,000	250	485	150	89,125	51,875
10,250	250	525	225	126,250	46,875
10,500	250	225	225	92,750	56,250
10,750	250	75	195	37,500	52,500
11,000	250	90	240	20,625	54,375
11,250	250	75	225	20,625	58,125
11,500	250	75	210	18,750	54,375
11,750	250	170	150	30,625	45,000
12,000	250	300	75	58,750	28,125
12,250	250	375		84,375	9,375
12,500	250	375		93,750	
12,750	250	300		84,375	
13,000	250	410		88,750	
13,250	250	75		60,625	
13,300	50			1,875	
13,750	450				
14,000	250	20		2,500	
14,250	250	75		11,875	
14,300	50			1,875	
17,000	2,700				
Total.	19,500			1,934,250	1,641,250
				Cubic meters. <sup>1</sup>	Cubic meters. <sup>1</sup>
				54,770	46,474

<sup>1</sup> Reduced to cubic meters at 35.3154 cubic feet per cubic meter.

## ESTIMATE OF THE WORK.

54,770 cubic meters of sand excavated, at \$0.40 .....	\$21,908
46,474 cubic meters of rock, at \$6.....	278,844
Total.....	300,752

This estimate amounts to the aforesaid \$300,752.



## APPENDIX K.

Sir: At the time of the establishment of this principal district office during the first ten days of March last the work of repair of the road from Caunao to the Hoyo de Manicaragua was being carried out, and in the last third of the preceding month the survey of the road from Placetas to Sancti Spiritus had been commenced and the readjustment of the plan for abutments and piles for the steel bridge over the river Damuji, at Rodas, was made. From March until June the work on the road from Caunao has continued uninterruptedly; that on the road from Placetas to Sancti Spiritus was commenced in the last third of April and continued without stoppage; the readjustment of the plan was finished and the piles and abutments of the road bridge were almost wholly put in place; during the first half of May the commission for general studies of works was organized, and on the 16th of the same month it commenced the study of the road from Santa Clara to Camajuani.

Attached to this report I send four tabulated statements relating to works carried out by administration from March to June, inclusive, showing, first, salaries and wages expended; second, the price of materials employed; third, unities of work done and their cost. Table 4 is a recapitulation of the expenditures of the district from March to June, inclusive. I have been unable to include the work done under contract in Tables 1, 2, and 3 from lack of the necessary data.

## WORKS OF REPAIR, CAUNAO ROAD, HOYO MANICARAGUA.

The work done shown by Table No. 3 comprises that which was done in the first 12 kilometers of the road from Caunao to Guaos in the clearing and leveling of the road, building of culverts, opening of ditches, and building the approaches to the bridges and culverts that was done by contract. Of the 28 bridges and culverts contracted for there have been finished and paid for the wooden bridge, 60 meters long, over Lagunillas River; that over Arroyo Arenas of 12 meters, finished but not yet paid for; two pontoons of 6 and 5 meters over the Arroyo Rosario were being floored over; a 3-meter culvert over the Saltadero stream; another 3-meter culvert over the Guaos stream, and the 48-meter bridge over the Hanabanilla River. For the 60-meter bridge over the Arinao River the central piers were in place and all the woodwork repaired and put together. I judge that the 28 bridges and culverts contracted for will be finished by the 28th of November.

The appropriation granted for this road amounts to.....	\$50,000.00
Cost of the bridges contracted for .....	28,340.00
Surplus available at the commencement for the other works of repair.....	21,660.00
Of the said surplus there had been expended up to June 30:	
Up to March 1.....	\$7,432.65
From March to June.....	10,491.56
	17,924.21
Available on June 30 for work not contracted for .....	3,735.79
Available on June 30 for works contracted for:	
Cost of works contracted for.....	\$28,340.00
Cost of Lagunillas Bridge.....	5,760.00
	22,580.00
Total available on June 30.....	26,315.79
Total expenditures up to June 30.....	23,684.21
Total appropriation.....	50,000.00

Up to June 30, with the \$26,315.79 expended since December, 1899, there had been cleared, leveled, and laid out the first 12 kilometers of the road, the bridge over Lagunillas River built, and the gradings and approaches for the latter and for those over the Arenas, Rosario, Saltadero, and Guaos streams. The \$23,684.21 available on the said date will be sufficient to finish all the needed bridges and to build the approaches for some 10 bridges and culverts of the 22 on the approaches of which no work has been done. To finish the work on this road, giving it a firm roadbed, there will be required, in addition to the amount available:

Clearing, leveling, and draining 38 kilometers, at \$1,600 each.....	\$60,800
Building firm roadbed on 50 kilometers, at \$3,400 each.....	170,000
Total.....	230,800

This road is one of the most important ones of the district, and should be finished before commencing other new works. The allotment of the \$230,800 necessary may be made at the rate of from \$10,000 to \$20,000 monthly.

## WORKS OF REPAIR TO THE ROAD FROM PLACETAS TO SANCTI SPIRITUS.

The work done, as shown in Table No. 3, comprises the survey of the road via Cabaiguan and Corajo, and of which there will only be utilized the part comprising the section between Cabaiguan and Sancti Spiritus; the clearing of the road between Cuatro Caminos and Hernando, in sections third and fourth of the definite route; the leveling and drainage in the most uneven part of the road between Mije and Cacique Hills, in sections third and fourth of the definite route. The said work has not progressed in proportion to the time that has transpired, due to the fact that the workmen of Sancti Spiritus, the only ones available, are accustomed to work connected with cattle raising, and are not constant in their work; due also to the heavy rains, and also to the fact that the centers of life and civilization are situated precisely at the opposite extremes of the road.

The appropriation granted for this work is.....	\$80,241.50
There have been expended up to June 30.....	6,984.13
Amount available on June 30.....	73,257.37

This balance will be sufficient to build a steel bridge over the river Tuinicu, at a cost of about \$25,000; some 40 bridges, pontoons, and culverts of wood at the river fords, streams, and gulches, and the approaches for the latter. To finish the work of this road, giving it a firm bed, there will be required in addition to the \$80,241.50 already appropriated:

For leveling, ditching, and the firm roadbed of 60 kilometers at \$5,500 per kilometer.....	\$330,000
Leveling and ditching (without firm roadbed) 13 kilometers of savannah at \$1,000.....	13,000
Total.....	343,000

The said amount may be expended at the rate of from \$10,000 to \$15,000 monthly. Although the present traffic is very limited, and, when the normal condition of former years is reestablished, will consist principally of cattle driving, the road from Placetas to Sancti Spiritus is of importance, because it completes the general line of communication between the north and south of the island in the eastern part of this province, and perhaps will be the means of opening up for cultivation an extensive district that has always been utilized for the breeding of cattle. I am of the opinion that the work should be carried out, although there are others in this district that would be of more immediate benefit.

## RODAS BRIDGE.

At the end of March the plan of the abutments and piers of this bridge was readjusted and excavations were commenced for the foundations of the same. On the 30th of June the following work had been done: Five hundred and five cubic meters of masonry of all kinds, which constitute the total amount specified in the project; 749 cubic meters of excavations for foundations and approaches, 117 meters more to be excavated; 600 cubic meters of grading for approaches, there still remaining 2,160 meters to be graded. In addition the scaffolding was erected to receive the metallic superstructure, the latter being all on hand ready to be put together. Notwithstanding the fact that on the 30th of June the total amount of masonry stipulated in the project was finished, the abutments were in an unfinished condition, due to the fact that the foundations of abutments and piers had been placed directly upon bed rock, which circumstance has made necessary a greater amount of masonry work than that provided for in the project. This excess redounds to the advantage of the work, and the contractor does not collect for the same.

Up to June 30 there had been expended.....	\$11,803.49
Available on June 30.....	17,296.51
Amount appropriated.....	28,600.00

No additional appropriation will be needed to finish the work contracted for, but it will be necessary for the Ayuntamiento, or in its default the State, to employ some \$2,000 to build the connection between the approaches comprised in the contract of the bridge with the public road on the Tanteo side and with San Felix street in the town. I deem this connection necessary for the opening of the bridge. This work will be finished during the second half of August.

## COMMISSION FOR GENERAL STUDIES OF WORKS.

This commission was organized in the first half of March, and on the 17th it commenced the study of the road from Santa Clara to Camajuani. Up to June 30 there had been surveyed and leveled 21.2 kilometers. The slowness that this indicates is due to the opening of sections in quest of better locations and to sundry investigations that have been made, especially in the crossings of the river Ochoa and its affluents,

to the severities of weather, and not in a small manner to the selection of the necessary personnel for all work undertaken. On the 30th of June the assistant engineer of this commission resigned, and I have not yet been able to find a substitute who can give guarantee that he will remain for some length of time in the position.

#### PRINCIPAL OFFICE.

The scarcity of personnel is notorious, and it is not sufficient to supply the lack thereof by working beyond the regular hours. There is lacking at least one assistant, either permanent or temporary, to aid me in the office work and inspections. The delay in sending this report is due to the said cause.

#### THE WORKS OF MOST IMPORTANCE TO BE DONE.

In roads, besides the finishing of those from Caunao to Hoyo de Manicaragua and from Placetas to Sancti Spiritus, the building of that from Santa Clara to Camajuani, under study at the present time, is a work of importance. I estimate its cost at \$185,000. As the efforts of the State are to-day restricted, and in the productive zones of this district there are so many roads impassable by carts, I am of the opinion that it would be of great benefit for the advancement of agricultural interests to build the bridges most needed on said roads, postponing the work of grading and putting in firm roadbeds until such time as the district may become more populated and the State may be able to put forth greater efforts. The dredging of the Damuji River and of a shoal situated in front of the government wharf in the port of Cienfuegos are works of great importance and necessity. I do not have sufficient data to estimate the cost thereof.

Yours, attentively,

D. LOMBILLO CLARK,  
Chief Engineer.

The DIRECTOR-GENERAL OF PUBLIC WORKS, *Habana.*

#### I.—Statement showing the salaries and wages expended in the work done in the province of Santa Clara, district of Santa Clara, during the fiscal year of 1899–1900.

[By administration.]

	No.	Salaries and wages.		No.	Salaries and wages.
Road from Placetas to Sancti Spiritus:			Road from Caunao to Manicaragua—Continued.		
Engineer .....	5	\$750.00	Foremen .....	16	\$640.00
Assistant .....	24 $\frac{1}{2}$	236.66	Laborers .....	8, 775 $\frac{1}{2}$	7, 020.20
Inspector .....	13 $\frac{3}{8}$	155.54			
Clerk .....	3 $\frac{3}{8}$	16.66	Total .....		9, 226.78
Leveler .....	3 $\frac{3}{8}$	244.83	General studies of works:		
Chainmen .....	5 $\frac{1}{2}$	291.66	Engineer .....	12 $\frac{3}{8}$	275.00
Foremen .....	7 $\frac{3}{8}$	331.50	Assistant .....	13 $\frac{3}{8}$	208.33
Boxes .....	2 $\frac{3}{8}$	83.00	Clerk .....	2 $\frac{3}{8}$	130.00
Laborers .....	4, 567 $\frac{1}{2}$	3, 688.33	Leveler .....	1 $\frac{3}{8}$	100.00
Total .....		5, 798.18	Chainmen .....	22 $\frac{3}{8}$ 1-2	99.75
Road from Caunao to Manicaragua:			Stakemen .....	14 $\frac{3}{8}$	68.33
Engineer .....	4	666.64	Laborers .....	307 $\frac{3}{8}$	261.00
Inspector .....	12	899.94	Total .....		1, 142.41

NOTE.—The foregoing are salaries and wages expended in work done by administration. I have no complete data of salaries, etc., paid by contractors of the bridges on the road from Caunao to Manicaragua, nor of the Rodas bridge. The day wages on Caunao road are all 80 cents. On Placetas road the majority are also 80 cents, but there are others of \$1.20, \$1, and 60 cents.

#### II.—Statement showing the prices of materials used in the work done in the province of Santa Clara, district of Santa Clara, during the last fiscal year.

[By administration.]

Road from Caunao to Manicaragua:			Road from Placetas to Sancti Spiritus—		
Crude oil .....	liter..	\$0.18	Continued.		
Wax .....	kilogram...	.65 $\frac{1}{2}$	English fuze .....	meter..	0.01 $\frac{1}{2}$
Hoop iron .....	do....	.10 $\frac{1}{2}$	Paint .....	kilogram...	.87
Clamps .....	do....	.10 $\frac{1}{2}$	Powder .....	do....	1.52
English fuze .....	meter..	.01 $\frac{1}{2}$	Tacks .....	package...	.08
Tacks .....	package...	.08	Commission of general studies of work:		
Tallow .....	kilogram...	.13	Stakes 1 foot by 1 $\frac{1}{2}$ inches .....	number..	.02
Road from Placetas to Sancti Spiritus:			Stakes 7 feet by 3 inches .....	do....	.32
Hemp .....	kilogram...	.65 $\frac{1}{2}$	Twine .....	kilogram...	.87
Fish line .....	do....	.97 $\frac{1}{2}$	Tacks .....	package..	.10

III.—Statement showing the cost of the unities of work of all kind done in the province of Santa Clara, district of Santa Clara, during the last fiscal year.

[By administration.]

	Cleaning of road.	Cleaning of ditches.	Opening of ditches.	Excavation.	
				Earth.	Stone.
	m. <sup>1</sup>	m. <sup>1</sup>	m. <sup>1</sup>	m. <sup>3</sup>	m. <sup>3</sup>
Road from Caunao to Hoyo Manicaragua: <sup>1</sup>					
Unities .....	2,585	13,854	5,312	2,170	483
Total cost .....	\$724.44	\$574.00	\$1,486.05	\$1,391.96	\$397.25
Cost per unity .....	.28	.42	.28	.6414	.82
Unity per day's wages .....	.028	.0019	.028	.0125	.0097
Road from Placetos to Sancti Spiritus: <sup>2</sup>					
Unities .....	16,200	-----	-----	780	-----
Total cost .....	\$3,641.64	-----	-----	\$891.74	-----
Cost per unity .....	.225	-----	-----	.0014	-----
Unity per day's wages .....	.003	-----	-----	.0071	-----

	Grading.	Stone crushed and spread.	Iron drains with dry mason work outlets.	Dry mason work.	Re-moval of fences.	Draw-ing of plans.	Surveys.
	m. <sup>3</sup>	m. <sup>3</sup>		m. <sup>3</sup>	m. <sup>1</sup>	kilo-meter.	kilo-meter.
Road from Caunao to Hoyo Manicaragua: <sup>1</sup>							
Unities .....	8,469	206	5	103	253	4	-----
Total cost .....	\$4,687.11	\$409.27	\$245.96	\$584.58	\$57.77	\$33.18	-----
Cost per unity .....	.554	1.99	49.20	5.67	.228	8.29	-----
Unity per day's wages .....	.0146	.004	.0016	.0014	.034	-----	-----
Road from Placetos to Sancti Spiritus: <sup>2</sup>							
Unities .....	1,960	-----	-----	353	-----	-----	17
Total cost .....	\$1,732.30	-----	-----	\$916.08	-----	-----	\$518.51
Cost per unity .....	.884	-----	-----	2.60	-----	-----	30.50
Unity per day's wages .....	.009	-----	-----	-----	-----	-----	-----
Commission for general studies of works: <sup>3</sup>							
Unities .....	-----	-----	-----	-----	-----	-----	21.2
Total cost .....	-----	-----	-----	-----	-----	-----	\$2,777.02
Cost per day's wages .....	-----	-----	-----	-----	-----	-----	1.30

<sup>1</sup> Direction and administration; percentage of the total cost of work, 18 per cent.

<sup>2</sup> Direction and administration; percentage of the total cost of work, 33 per cent.

<sup>3</sup> Administration; percentage of the total cost of work, 32 per cent.

NOTE.—The total cost includes the corresponding proportional part of the expenses of the principal office.

IV.—Statement showing the expenditures of the district of Santa Clara, province of Santa Clara, during the months of March, April, May, and June of the fiscal year of 1899 to 1900.

Services and works.	By contract.	For personnel.		For materials.	Sundry services.	Total.
		Salaries and wages.	Indemnities.			
Head office (including installation expenses) .....	-----	\$1,971.33	\$16.47	\$740.65	\$136.12	\$2,864.57
Road from Placetos to Sancti Spiritus .....	-----	5,798.18	217.05	778.84	190.06	6,984.13
Road from Caunao to Manicaragua .....	\$5,760.00	9,226.78	141.57	690.61	432.60	16,251.56
General studies of works .....	-----	1,142.41	132.02	670.92	115.53	2,060.88
Bridge over Damuji River at Rodas .....	11,303.49	-----	-----	-----	-----	11,303.49
Railroad inspection .....	-----	-----	3.26	-----	-----	3.26
Total .....	17,063.49	18,138.70	510.37	2,881.02	874.31	39,467.89

## APPENDIX L.

DEPARTMENT OF PUBLIC WORKS,  
PROVINCE OF PUERTO PRINCIPE,  
*Puerto Principe, June 24, 1900.*

SIR: In accordance with the provisions of article 25 of the regulations of public works, the undersigned has prepared and forwards to you a statement of the works effected by this department since the establishment thereof on the 1st of February of the present year. The undersigned has attached to the said statement an explanation of the works the construction of which seem most urgent for the promotion of the welfare of this district.

Reasons with which that department is fully acquainted have intervened and prevented this department from carrying out on the land any work whatsoever, said department having confined its actions to the preparation of plans and estimates for the repairing and building of several bridges.

In fact, the public works of the province have been under the control of the military governor, on the one hand, and on the other the lack of instruments has prevented everything from being done other than that of the preparation of the projects above mentioned, the data of which have been secured with great difficulty—so much the greater for the reason that a duly qualified assistant could not be found during all this time, nor would it have proved of any advantage to have an employee of that nature without any instruments whereby his services could be turned to any profitable account and without any allotment whatsoever to carry out the projects that had been effected.

The statement of what has been done under such circumstances will, therefore, appear poor, and the undersigned feels that he must, necessarily, justify the involuntary as well as irremediable inaction to which this department has been submitted.

Nevertheless, making use of the data that this department possessed and of others that were found in the archives, which data it has been necessary only to verify, the following of bridges have been prepared:

*Project for repairs.*

Class.	Name.	Site.	Estimate.
Stone and mortar .....	Mendez .....	Outskirts of the city .....	\$738. 20
	Tinima .....	do .....	20. 00
	Carrasco .....	do .....	425. 50
	Santa Cruz .....	do .....	279. 00
	Juan de Toro .....	do .....	283. 00
Amount .....			1, 746. 20
15 per cent profit to the contractor .....			261. 93
10 per cent, management, etc. ....			174. 62
Total .....			2, 182. 75
Wood .....	Sibanicu .....	Road to Cuba .....	186. 25
	Imias .....	do .....	2, 810. 29
	Piedras .....	Road to Habana .....	363. 37
	Hicacos .....	do .....	112. 50
	Burro .....	do .....	130. 00
	Blanco .....	do .....	82. 50
	Platano .....	do .....	98. 37
	Jucaro .....	do .....	85. 00
	Lazaro .....	do .....	108. 75
Additional iron work for these bridges .....			100. 00
Total .....			4, 077. 03
Projects of new constructions:			
Of wood, with arches of stone and mortar.	Seibabo .....	Road to Cuba .....	2, 191. 50
	La Yaba .....	Road to Santa Cruz .....	1, 678. 00
	Cascorro .....	Road to Cuba .....	4, 728. 12
	San Miguel .....	Road to Nuevitas .....	9, 312. 80
Total .....			17, 917. 42

Furthermore, the portions of the way between the city of Nuevitas and the bridge of San Miguel were examined, as well as the lands between Sibanicu and Cascorro, for the purpose of determining which is the most practical means of establishing roads of communication through the said districts.

The poor condition of many of the bridges, the repairs of which have been estimated above, has become worse since the same were examined a few months ago, as occurs with that of "Hicacos," which has been newly damaged, as I have been advised, and that of "Imas," from which the residents and passers by have taken materials that may have been utilized, thus damaging to a greater extent the structure thereof, and all the above-mentioned facts will cause the estimates given to be raised for the repairs of the same. Concerning the works in the interior of the province, to which special attention must be given, I submit to your clear judgment the following considerations, for the illustration of which I inclose herewith a plan of the studies that must be made, and I expound the method for carrying into effect the works, giving the probable estimates of said works.

As soon as anyone travels in the interior of this province the total lack of roads of communication will be noticed, and it will also be observed that great efforts, which have proved useless, have been made to establish inhabited places that may serve as markets for certain productions, such as molasses, wax, corals, textile fabrics, cheese, etc., which places would in their turn facilitate the acquisition in the rural wards of certain articles for consumption, inasmuch as all that which is sold as well as all that which is bought would be of an exceedingly high price were same to be acquired in the cities and conveyed therefrom. Due to the lack of public roads the growth of said inhabited places is affected for the reason that the price of the merchandise imported increases and there prevails the most gross usury, and the price of the natural productions of the country, which the owner is not able to convey to the cities, greatly diminishes. Consequently, the progress of the inhabited places is stopped, and the farmers do not prosper, poverty and usury being the cause of the decay of the district, the only ones that thrive being a few grocers, who in a short time obtain all that the inhabitants of the territory may have saved.

The towns of Magarabomba, Sibanicu, Cascorro, Guaimaro, Contramaestre, Jicotea, San Miguel, and others are eloquent examples of the above statements.

In consequence of the aforesaid circumstances, and for the reason that this province has not convenient ports on the north and south at a distance of 40 or 50 miles from one another as others have, the interior of the country languishes and the population does not increase, nor do the inhabited places prosper and trade is not developed, for it seems that the interior portion of the province is situated many hundred miles from commercial centers. This is owing not to the distance but to the lack of ports and of public roads, which in this province are worse than those of other territories in consequence of the difficult and slow drainage of our tracts of level land and of the thickness of the woods.

Therefore the most urgent steps that are demanded at present for the development and reconstruction of the province are no doubt those required for the improvement of the ports; that of Santa Cruz, on the north coast, being the one to which our attention should be given in the first place; and for the building of public roads, whereby access may be had at all times whatsoever to the capital, to the ports, and to the adjoining provinces.

The most important roads that may be established in this province are the following: (1) That of Santa Cruz del Sur, length, 92 kilometers; (2) that of Habana, through Magarabomba, Ciego de Avila, and Jicotea up to the boundary of the province; length, 160 kilometers. And joining the above mentioned that of Moron, in Lazaro, which may be continued up to the limits of the province, through Chambas. Length, 100 kilos; total length, 260 kilometers. Or even better, second that of Habana, through San Geronimo, Ciego de Avila, and Jicotea up to the boundaries of the province; length, 158 kilometers. That of Moron joining the above at Ojo de Agua and continuing through Chambas up to the limit of the province. Length, 892 kilometers; total length, 240. That of Santiago de Cuba up to the river Jobabo with 103 kilometers; (4) that of Nuevitas with 80 kilometers. The length specified herein is not precisely correct, although nearly exact.

Among the above-mentioned roads the undersigned is of the opinion that the one of Santa Cruz is the most necessary of all, inasmuch as it crosses the most fertile lands of the district and connects the said port with the capital, and thus there will exist communications from Nuevitas to Santa Cruz—from coast to coast—by means of the railroad and the highway that may be built. The one that follows in importance is that of Habana, through San Geronimo and Ciego de Avila, not only for the reason that it is shorter, but because it crosses the province almost through the geometrical center and facilitates communication to a great many farms situated on the right and left and for the reason that the said road is preferred by cattle owners for the conveyance of cattle to the markets of the western part of the island. Furthermore, as Moron is adjoining to Ciego de Avila, said important town would have a convenient and suitable communication, although indirect, with the capital.

The road that goes to Santiago de Cuba is of primary importance inasmuch as same would join a great many inhabited places, and inasmuch as there exist in that district a great many cattle farms. The building of this road has been commenced by the military engineers and many bridges may be found on the same; that of Santa Cruz has also been commenced. Therefore, the three public roads which are most important are the following: That of Santa Cruz, length, 92 kilometers; that of Habana, through San Geronimo, 158 kilometers; that of Santiago de Cuba, 102 kilometers; or a total length of 352 kilometers.

The study of the aforesaid roads could be commenced at once as well as that of the bridges and sewers that may be required, and of the means that may be obtained relating to constructing materials along the way that may be selected. I must state that although the above-mentioned roads are old, the outlines thereof should not be confined in making the topographical plan of the present road for the reason that said outlines are very deficient; which fact will necessarily cause the said work to be carried out with more delay and during a long time.

The cost that these kinds of work may originate in districts not greatly published, and with so many woods as must be crossed, can not be fixed so correctly as when dealing with populated and open districts, for obvious reasons; nevertheless, as the greater length of the roads must follow that of public highways, and as level tracts of land must be crossed, the expenses required, and which I hereafter specify, will not be exaggerated.

The topographical notes and those for the leveling may be taken at the rate of 1½ kilometers daily, and, taking into consideration the time that may be required to make the plans of water courses and for the outline (talweg) and sections, the daily work may be reduced to 1 kilometer daily. The personnel should be as follows:

One assistant engineer.....	\$5.00
Two assistants at \$2 each.....	4.00
Four laborers at \$1.....	4.00
One muleteer.....	1.50

Total daily expense or by kilometer..... 14.50

To the above there must be added the work of officers for the making of the topographical plan, that of the outline, works of art, etc., for which purpose there may be assigned 20 per cent more; and, therefore, the total amount for each kilometer would be \$17.40. Taking into account the days on which no work may be carried on in consequence of rain, and expenses for unforeseen contingencies, the undersigned deems it judicious to estimate the said studies, including the plans, etc., at the rate of \$20 per kilometer. However, the foregoing calculation may be corrected.

Should it be deemed expedient to proceed to the study of highways, the technical conditions to which the projects should be submitted must be studied, and for the aforesaid purpose I suggest the following:

I forthwith advise that the macadam system be adopted for the reason that it is economical and because the roadbed may be constructed with soft stone (decomposed serpentine), which greatly abounds in the plains. Making the road 5 meters wide and widening same in the turns in order that vehicles may easily cross, the value of every kilometer of the highway may be greatly reduced. As almost all the lands are level, high terrepleins will not be required, and taking one 5 per cent for the grades, it may be estimated that the average height will not exceed 0.50 meters. The road-bed of stone or fragments will be 5 meters wide, and in the center it may be 25 centimeters thick and 15 at the borders of the highway. The trenches or ditches and drains to be of a triangular form with 60 centimeters of opening and the same amount of depth. With the foregoing data, the expenses for each kilometer of the highway may be approximately estimated as follows:

To open and clean, etc., each kilometer 10 meters wide.....	\$60.00
1,200 cubic meters of excavated lands at 20 cubic centimeters deep, at 50 cents each.....	600.00
2,370 cubic meters of terreplein of rammed earth taken from the ditches or pits of 505 meters, at 60 cents.....	2,370.00
1,200 superficial meters of stones for —and for the defense of— at \$1.50.....	2,160.00
1,000 meters fragments of stone, at \$3.....	3,000.00
Study, plan, etc.....	20.00
A work of art for each kilometer (drainage).....	500.00
Expenses for unforeseen contingencies, 5 per cent.....	434.50
Management, control, etc., 10 per cent.....	869.00

Total amount..... 9,993.50

The lineal meter costs \$9.99, namely \$10 gold, and I judge that this price greatly approaches the real expenses that must be incurred. The inspection of the highways and bridges may be commenced at once. The rain during these months will some-

what hinder the works, but if same are carried out at present, when the dry season comes the plans will have been prepared as well as the estimates, and the heavy currents will enable to exactly determine the dimensions that must be given to the bridges and arches.

On the other hand, the contracts for the building of the bridges should be entered into at present in order that the wood required may be secured and that same be dry when it must be used. There also follows the advantage of contracting the wood during these months for the reason that in the dry season all the carts are used in the sugar plantations or in the conveyance of wood to the coast, and it is difficult to find anyone willing to undertake small works of this kind. The building of highways may be continued during the whole year if the portions of the same left for the spring are high or sandy.

I will close stating that the works commenced in the highway of Santiago de Cuba may be continued in the part of level land, which is a highland upon which the works have been commenced, until the lowlands are reached, upon which nothing should be done until winter.

The inspection and study of that of Santa Cruz may be commenced at once (if that of Santiago de Cuba is not commenced), or as soon as the plans and the outlines have been made in connection with the latter, and finished up to where I have above indicated, which is a short portion.

As I have not received any orders concerning the works that must be commenced next year, with the exception of the study of the bridges, which I continue at present, there has not arrived the time of framing the estimates.

Finally, I inclose herewith a list of the expenses of "general studies," the only technical work intrusted to me.

Respectfully,

GENERAL DIRECTOR OF PUBLIC WORKS,  
Habana.

POMPEYO SARIOL,  
Engineer, Chief of Public Works

PUERTO PRINCIPE, June 26, 1900.

*Statement of the expenses made under the item "General matters" during the fiscal year that ends on June 30, 1900.*

Month in which payment made.	Designation.	Amount.
March .....	Pay roll, 1 delineator.....	\$8.33
April .....	do .....	50.00
	Per diem expenses for several inspections made by the inspector .....	27.00
May .....	Pay roll, 1 delineator.....	50.00
	Instruments for drawing, copy books, etc.....	244.96
June .....	Pay roll, personnel of studies.....	473.29

#### APPENDIX M.

OFFICE OF PUBLIC WORKS OF PROVINCE OF SANTIAGO DE CUBA,  
Santiago de Cuba, July 30, 1900.

SIR: I have the honor to forward to you the annual report of the works and services performed by this office from the time of its reorganization in October of 1899 until the 30th of June, 1900, accompanied by a general recapitulation of all the expenditures incurred during the said period.

Yours, respectfully,

J. M. PORTUONDO, Chief Engineer

SECRETARY OF PUBLIC WORKS.

#### ANNUAL REPORT OF THE SERVICES AND WORK PERFORMED BY THIS OFFICE DURING THE FISCAL YEAR OF 1899-1900.

The principal office of public works of this province was established anew on the 11th of October, 1899, until which date, and from the time of the occupation of the city by the Army of the United States, all works had been in charge of the military



engineer corps of the department. On the 3d of November of that year it was definitely placed in charge of the management of the light-houses of the province, and the reorganization of the said service, which until then had been in charge of the different military commanders of ports, was proceeded with until the 1st day of March, 1900, when it was handed over to the light-house commission that was created in January.

The other matters pertaining to the branch of public works in general have continued up to the present time in charge of the military engineers of the department, and therefore this office has not carried out the work which under other circumstances it could have done. The studies and works carried out are the following ones: Rebuilding and widening the government wharf at Caimanera, at the port of Guantanamo; repair to light-house at the port of Baracoa; rebuilding of the government wharf at Gibara; rebuilding the bridge at Mao, on the road from Santiago de Cuba to Cristo, three different plans for rebuilding having been made; rebuilding of the Aguacate bridge, on the road from Santiago de Cuba to Cristo, four plans of different kinds of work having been made; repair to the culvert on the road from Santiago de Cuba to Cristo; commencement of the preliminary studies for the road from San Luis to Holguin.

#### WORKS.

At the government wharf at Caimanera, at the port of Guantanamo, the following work has been done: There have been driven 26 piles of 7 meters length, or 182 linear meters; 50 piles of 8 meters length, or 400 linear meters; 14 piles of 9 meters length, or 126 linear meters; 1 pile of 10 meters length, or 10 linear meters; 1 pile of 12 meters length, or 12 linear meters; total, 730 lineal meters.

#### WORKS MOST NECESSARY IN THE PROVINCE.

*Port of Gibara.*—It may be said that there is no wharf in this port, as that of the government is in such a deteriorated condition that it is dangerous to pass over the part which is not completely destroyed. In view of the importance of the said port it is absolutely necessary that the said wharf be rebuilt as quickly as possible and for this purpose a complete project of the work was sent to the department of public works on the 28th of March of this year, giving an estimate of the contract cost of \$60,986.29.

*Port of Baracoa.*—The government wharf at this port is also in a state of ruin to the extent that at the present time the operation of loading and discharging is only carried out at a private wharf of Messrs. Mones & Co. It is thought that a wharf of the proper dimensions for the commercial importance of the port may be built for \$12,000.

In the other ports of the province work of this kind is not needed for the present, as in Manzanillo there are four private wharfs in good condition, in Guantanamo the government wharf is being rebuilt at the present time, and in Santiago de Cuba the government wharf was extended for 50 meters by the military government; and, besides, there are other private wharves.

#### TURNPIKES.

In this province there are no built turnpikes. The military government has done important work on the roads from Santiago de Cuba to San Luis, from Santiago de Cuba to Caney, from Santiago de Cuba to Morro, and from Santiago de Cuba to Cobre. The other roads of the province are in a miserable condition of repair and are impassable at certain times of the year, during the heavy rains.

Under the impossibility of undertaking works or even surveys on all the roads requiring it, owing to other works requiring consideration throughout the province, a statement only has been made, giving the most important studies that should be commenced at once and in the order that they should be made; also an approximate estimate of the expenses that may be incurred in said preliminary studies in field work, thus establishing a network of communication between the principal interior towns of the province. There are lacking in the said statement the estimates for the studies of the roads from Guantanamo to Sagua de Tanamo and from Guantanamo to Baracoa, which are not included because the cost, in view of the length and great unevenness of the same, would be excessive, and because of their relatively small importance.

Order of importance.	Roads.	Distance.	Approximate cost.
		<i>Kilos.</i>	
First.....	San Luis to Holguin, through Cauto Abajo Canoa and San Francisco.	116	\$1,600
Second.....	Manzanillo to Bayamo, passing through Veguitas.....	60	900
Third.....	Bayamo to San Luis, through Jiguani, Baire, and Palma Soriano.	120	1,800
Fourth.....	Bayamo to Victoria de las Tunas, through Cauto Embarcadero.	90	1,200
Fifth.....	Victoria de las Tunas to Puerto Padre.....	50	700
Sixth.....	Holguin to Bayamo, through San Pedro.....	85	1,200
Seventh.....	Mayari to Cauto Abajo.....	80	1,200
Eighth.....	Santiago de Cuba to Guantanamo.....	80	1,600

The distance and estimates stated for each road are merely approximate ones, but it is thought that the said amounts will in reality be sufficient for the preliminary field studies of the same. It is impossible even to give an approximate idea of the cost of carrying out any of the said works from absence of the necessary data, which can only be obtained on the spot.

## RAILROADS.

From the time of the reorganization of this office due inspection and vigilance has been exercised over the railroads of the province.

*Santiago de Cuba Railroad.*—On the 10th of November, 1899, the regulation tests were made of the work done on the (Purgatorio) wooden bridge, situated near kilometer No. 6, the foundations of which had been moved by a heavy freshet in the stream that runs underneath the bridge, from which date the passage of trains over the bridge, which had been interrupted since the 30th of October, was reestablished. The work of reconstruction done at La Maya, at the termination of the Sabanilla branch, was received on the 27th of March, and opened to the public service on the 1st of April. On the same date the work of earth refillings done on the 7 wooden bridges of said branch was also received. The railroad company has made the following changes in its freight tariff: Coal, reduction of 60 per cent in freight; molasses, 75 per cent in freight; tiles, lime, and ice, 50 per cent in freight; rum, 50 per cent in freight. Roman cement, changed from third-class rate to first class. Rails for plantation railroads, changed to third-class freight. The Boniato station, which was destroyed during the war, is being rebuilt. Two slight accidents have occurred during the year.

*Gibara and Holguin Railroad.*—On the 1st of January of this year a notable reduction in the general freight tariff was made of that which was in force from the 1st of May, 1899, the freight of all articles, almost, being reduced to 33 per cent. A further reduction has been made in the tariff which will go into force on the 1st of July, whereby certain articles are benefited to the extent of 25 per cent and others to that of 30 per cent. Throughout the year there has been no accident on the road.

*Guantanamo Railroad.*—Only one accident has occurred during the year.

*Juragua Railroad.*—Barriers have been placed at the three crossings at grade. No accident has occurred on the line during the year.

J. M. PORTUONDO, *Chief Engineer.*

SANTIAGO DE CUBA, June 30, 1900.

*General recapitulation of the expenditures made by this office during the year 1899 to 1900.*

Office personnel.....	\$3,149.95	Care of wharves.....	\$84.80
Office supplies.....	160.00	Repairs to Caimanera wharf (Guantanamo.....	1,983.70
Payment for professional services.....	70.00	Studies of general works.....	1,271.55
Light-house personnel.....	2,863.51	Purchase of instruments.....	515.00
Light-house supplies.....	1,562.36		
Installation of office.....	649.29	Total.....	12,493.49
Rental of building.....	80.00		
Wharf personnel.....	103.33		



REPORT  
OF THE  
SECRETARY OF PUBLIC WORKS

FOR THE SIX MONTHS ENDING DECEMBER 31, 1900.

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HEADQUARTERS DEPARTMENT OF CUBA,  
OFFICE OF THE SECRETARY OF PUBLIC WORKS,  
*Habana, February 26, 1901.*

SIR: Complying with instructions received from you, I have the honor to forward you a report of the works executed by this department during the six months ending December 31, 1900.

Respectfully submitted.

JOSÉ R. VILLALON,  
*Secretary of Public Works.*

The HONORABLE MILITARY GOVERNOR, *City.*

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REPORT OF THE OPERATIONS OF THE DEPARTMENT OF PUBLIC WORKS DURING THE  
SIX MONTHS ENDING DECEMBER 31, 1900.

On June 15, 1900, this department was notified that on the 1st of July, 1900, all of the works being constructed by the officers of the American Army would be delivered to the department of public works in the provinces of Pinar del Rio, Matanzas, and Puerto Principe, and they were accordingly delivered and received. In Pinar del Rio the works under construction were from Consolacion del Sur to the station of the Western Railway, from Cabanas to Bahia Honda, and from Bahia Honda to the harbor of the same name. In Matanzas no transfer was made. In Puerto Principe were received the works of the drainage canal at Minas, the works constituting the repairs to the roads leading out of Puerto Principe, and the highway from Nuevitas to Puerto Principe. All of these works have been continued in the manner set forth by the chief engineers of the districts, in their respective reports. In view of the fact that nearly every one of these works was begun without a previous survey of the same, in many cases work was ordered suspended, and surveying parties were organized, charged with the preparation of detail plans, as prescribed by the rules and regulations of the department of public works.

On July 14, 1900, this department was also notified that on August 1, 1900, the works being constructed by the officers of the American Army in the provinces of Habana, Santa Clara, and Santiago de Cuba would be delivered to the department of public works. Those in the province of Habana were as follows: The highway from Cano to Wajay and the pumping station at San Nicolas. In the province of Santa Clara the highway from Trinidad to Casilda was delivered, and in Santiago de Cuba nothing. In the reports herein appended, made by the respective chief engineers of the districts, there is an account given of the delivery of these works. At the time the transfer was made it was not accompanied by the delivery, in any case, of plans, profiles, or specifications relative to any of the works.

The organization of the department continues the same as during the preceding semiannual period, with the only difference that the resignation, on account of illness, of the chief engineer of the province of Matanzas was accepted, the said vacancy

being filled by Mr. Juan Peoli. Subsequently the chief engineers of the districts of Matanzas and Santa Clara have exchanged districts. The resignations of the paymasters of the districts of Santa Clara and Pinar del Rio, presented in due course, were accepted, and the vacancies filled by Messrs. F. Franquis and Santiago de la Hoya, who were appointed to the positions.

In regard to surveys and construction of works the accompanying list of same can be referred to, the detailed information of which works are given in the reports of the chief engineers of the districts hereto appended.

*Statement of works finished between January 1, 1899, and January 31, 1901.*

DISTRICT OF HABANA.

*Repairing kilometers 20 to 21 of the highway to Guines.*—Consists in renovating the metalling 5 meters in width and 2,026 meters, using at the rate of something over 1 cubic meter of broken stone for each lineal meter; binding material, rolling, and cleaning necessary. Appropriation granted May 12, 1900, \$7,213; value of the works, \$7,213.

*Repairing kilometers 25 to 27 of the highway to Guines.*—Consists in renovating 1,588 linear meters of metalling 5 meters wide, with an average thickness of 0.216 meter at the middle and 0.11 on the sides, and the necessary rolling and spreading of binding material. Special appropriation granted May 12, 1900, \$4,156.90; total value of the works, \$4,155.88.

*Repairing kilometers 10 to 20 of the highway to Managua.*—Includes the total renovation of the metalling on said kilometers with an average thickness of 0.25 meter in the middle and 0.15 meter on the sides and the necessary spreading of binding material and rolling and the construction of a culvert having a span of 3 meters proposed to be built of the composition of masonry and bricks, with an inner span of metal, and I girders and platform of used rails and railings of the same material. Special appropriation granted February 10, 1900, \$2,847.66; total value of the works, \$2,548.09.

*Bridge over Martin Perez River.*—The work done consisted in substituting the wooden bridge, which was in a ruinous condition, by another of steel having a span of 16.50 meters, with place girders, buckle-plate floors, and macadam metal. Appropriation included March 19, 1899, in the twentieth clause of article 2 of the estimate for expenses of the department for the year ending March, 1900, \$90,000; estimate for these works approved November 15, 1900, \$4,247; total amount expended on same, \$4,332.

*Reconstruction of bridge over Santa Cruz Creek, kilometer 17, highway to San Cristobal.*—This bridge consists of two spans, 5.55 meters; the original flooring was destroyed and replaced by steel girders, the piers and pillars repaired, the work replastered, and other repairs necessary were made. Appropriation included March 17, 1899, in clause 20 of article 2 of expenses, etc., \$90,000; estimate for these works approved March 17, 1900, \$1,551.92; total amount expended on same, \$1,597.17.

*Reconstruction of the pontoon Anafe.*—Situated on kilometer 21 of the highway to San Cristobal, substituting the brick arches by an inner span of metal made of I beams 0.25 meter in sight and flooring of old rails and iron railings added. Appropriation included March 17, 1899, in clause 20 of article 2 of the estimate for expenses, etc., \$90,000; estimate of these works approved December 4, 1899, \$600; total amount expended on same, \$605.19.

*Repairing kilometers 19 to 25 of the highway to Bejucal.*—Consists in metalling road 0.25 meter in thickness in the middle and 0.15 meter on the sides, 5 meters wide, and the construction of a culvert at kilometer 20 having a span of 2 meters, made of masonry, with flooring of rails and two box drains at kilometer 19 and the other at kilometer 22. Appropriation included March 17, 1899, in clause 20 of article 2 of the estimate for expenses, etc., \$90,000; estimate for these works approved December 1, 1899, \$24,000; total amount expended on works, \$24,494.43.

*Repairing 2,270 meters of the branch highway to Santa Maria del Rosario.*—Consists in renewing metalling on same with necessary spreading of binding materials and rolling, using 1,000 cubic meters of broken stone 0.06 in size. Appropriation included March 17, 1899, in clause 20, article 2, of the estimate for expenses, etc., \$90,000; estimate for these works approved April 21, 1899, \$3,235; total amount expended on works, \$2,870.

*Repairing road house Cruz de Piedra at kilometer 11 of the highway from Luyano to La Gallega.*—Consisting in slight repairs in plastering, carpenter work, and painting. Appropriation included March 17, 1899, in clause 20, article 2, of the estimate for expenses, etc., \$90,000; estimate of these works approved February 8, 1900, \$222.80; total amount expended on same, \$222.80.

*Complete repairing of road house at kilometer 5 of the highway from Luyano to La Gallega.*—Consisting in slight repairs in plastering, carpenter work, and painting. Appropriation included March 17, 1899, in clause 20, article 2, of the estimate for expenses, etc., \$90,000; estimate of these works approved March 20, 1900, \$325.05; total amount expended on same, \$325.05.

*Road house at kilometer 5 of the highway to San Cristobal.*—Frame kitchen and two rooms added to it. Appropriation included March 17, 1899, in clause 20, article 2, of estimate for expenses, etc., \$90,000; estimate of these works approved January 22, 1900, \$185.58; total amount expended on same, \$185.58.

Keeping in repair fifteen road houses of the department, used for the services of highways in the district of Habana; small repairs for which the chief engineers of the district are authorized without requiring them to present projects and which are made inside the appropriation of \$90,000, to which reference has been made.

Cleaning and patching 1.35 kilometers of highway, such repairs being made by the chief engineers of the district inside of the appropriation of \$90,000 approved for the maintenance of highways and for which no projects are prepared.

*Repairing foundation of pier on the bridge of the Almendares River at kilometer 13 of the highway to Managua.*—Consists of repairing with hydraulic tiles a fissure found in said pier. Appropriation included March 17, 1899, in clause 20, article 2, of estimate for expenses, etc., \$90,000; estimate for these works approved April 11, 1900, \$250; total amount expended on same, \$76.15.

*Repairing the bridge above mentioned.*—Repairing the crossbeams, 100 feet in length, and the flooring with pine boards, 4 by 12 inches, for a length of 50 feet, 16 feet wide; the rest of the flooring was made of native hard wood, with the exception of 8 cross, which were made of pine. Appropriation included, March 17, 1899, in clause 20 of article 2, of estimate for expenses, etc., \$90,000; estimate for these works approved April 4, 1900, \$140; total amount expended on same, \$279.07.

*Repairing kilometers 3 to 5 of the highway to San Cristobal.*—A section 2,500 meters in length, relaying metaling of an average width of 7 and 5 meters with a layer of broken stone, with an average thickness of 0.223 meter in the middle and 0.103 meter on the sides, it being estimated that about 2,600 cubic meters of stone will be required, taking as a basis the width of the road of 7 meters for kilometer 3; 6 meters for kilometer 4, and 5 meters for kilometer 5, and the necessary spreading of binding materials, sprinkling, and rolling.

## PINAR DEL RIO.

*Building bridges over the Yaguasa and Rio Hondo rivers, on the highway to San Cristobal.*—Bridges of the Pratt system. The Yaguasa River has a span of 24.80 meters and the other 25.40, width 18 feet, height 19 feet. The flooring is formed by I-beams and boards, covered with a layer of cement 3 inches in thickness, and metaling of macadam, railing, and at the end stone piers.

Cost, freight charges, insurance, and customs duties of all the materials for building bridges delivered at the Hacendado wharf figures at.....	\$8,270
Expense of placing materials at the point where bridge was constructed, and cost of putting it up, painting, etc.....	4,580
Hardware.....	65
	12,915
Appropriation included, March 17, 1899, in clause 20, article 2, of the estimate for expenses, etc.....	90,000
Estimates for these works, approved December 30, 1899.....	12,915
Total amount expended on same.....	12,915

Cleaning and patching 100 kilometers of highway and keeping in repair the road houses for laborers; slight repairs done without projects being approved, inside of the appropriation of \$90,000, to which reference has already been made.

Repairing bridges on the road from Pinar del Rio to Consolacion del Sur and to San Juan y Martinez: El Colorado over the Gauma River, 7 meters long and 5.40 meters wide, or a total of 361.8 square meters, at the rate of \$1,800 per square meter; bridge situated over Guama River at Paso Viejo, 61 meters long and 4.30 meters wide, or a total of 263.3 square meters of platform, at \$7.50 per square meter, at the same time building an embankment at the western entrance to same and retaining walls and repairing the approaches to the bridge, with an extension, 16 meters by 4.30 meters, at the rate of \$30 per square meter; bridge over the Ajiconal River, 44.50 meters in length by 4.30 meters in width, or a total of 191.35 square meters of platform, at the rate of \$7.50 per square meter, besides two extensions, one on either side, 9 meters by 4.30 meters each one, and embankment and retaining walls at the eastern end and repairing embankment at western entrance; bridge on Feo River, 64 meters by 5.20 meters, or a total of 332.8 square meters of platform, at \$7.50 per square meter, and also repairing the approaches; bridge over Seco River, 12.30 meters long by 4.40 meters

wide, or a total of 54.12 square meters of platform, at \$7.50 per square meter, and also repairing approaches; bridge over San Sebastian River, 60 meters long by 4.40 meters wide, or a total of 264 square meters of platform, at \$10 per square meter, and also repairing approaches; bridge over San Juan River, measuring 34.50 meters by 5.35 meters, or a total of 184.575 square meters of platform, at the rate of \$10 per square meter, and also repairing approaches. Appropriation approved December 4, 1899, including amount necessary for the Rio Hondo, Galiano, and Trancas bridges, \$42,608.42; total amount expended on works, \$24,358.42.

## DISTRICT OF MATANZAS.

*Placing beacons and buoys in Cardenas Harbor.*—Consists in placing 10 buoys, of which 8 were new and the balance repaired. Appropriation, that consigned in clause 22, article 3, of the budget for expenses of the department for the year ending March, 1899. Estimate of the works approved May 29, 1899, \$272,483; total amount expended on same, \$2,700.

*Construction of highway from Matanzas to Canasi.*—Five kilometers of this highway have been finished and its total length surveyed. The appropriation and the cost of these works are shown in the statement of works in process of execution.

## SANTA CLARA.

*Construction of steel bridges over Damaji River at Rodas.*—Consisting of 3 spans, a central span of the Pratt system of 150 feet, and two, one on either side, Warren system, of 55 feet, and the necessary piers and abutments constructed, and a temporary wooden bridge, used afterwards for Falls Bridge. Appropriation granted January 23, 1900, \$28,600; total amount expended on the works, \$28,600.

*Construction of 2,134 meters of highway, from Trinidad to Casilda, with metaling of macadam, and construction of two culverts.*—The balance of these highways, having a total length of 4,770 meters, was constructed by the military government, at a cost of \$19,147.65. No project was approved in these works. Appropriation granted August 18, 1900, \$15,495; amount transferred, \$697.78; total, \$16,192.78; total amount expended on the works, \$15,540.98.

*Works on the road between Caunao and Manicaragua.*—Consists in grading 11 kilometers between Caunao and Guaos, and building 12 culverts, both works done by department labor, and in the construction on the entire road of the following bridges by contract:

Bridge over the Hanabanilla River of 4 spans, 7 meters high, the platform measuring 4 meters wide by 48 in length, or a total of 192 square meters, at \$24 per square meter .....	\$4,608.00
Pontoon at Guaos, having one span, 2 meters high, and the platform, 4 meters wide by 3 in length, or a total of 12 square meters, at \$28 per square meter .....	336.00
Pontoon at Saltadero, with one span of 12 meters, and platform of 4 by 3 meters, or a total of 12 square meters, at \$28 per square meter .....	336.00
Pontoon at Rosario (second crossing), having a span of 3.50 meters, and platform of 4 by 5 meters, or a total of 20 square meters, at the rate of \$27 per square meter .....	540.00
Pontoon at Martinez, 3.50 meters high, with a platform of 4 by 6 meters, or a total of 24 square meters, at the rate of \$27 per square meter .....	684.00
Bridge over the Lagunilla River, the platform of which is 4 by 60 meters, or a total of 240 square meters, at the rate of \$24 per square meter .....	5,760.00
Additional repairs to three of the pillars of the bridge over the Hanabanilla River .....	413.70
Pontoon at Rosario (first crossing), measures 6 by 4 meters, or a total of 24 square meters of platform, at the rate of \$27 per square meter .....	648.00
Additional repairs to the latter, consisting of an inner span, like that projected .....	648.00
Pontoon over the Arenas Creek, with a platform measuring 12 by 4 meters, or a total of 48 square meters, at \$25 per square meter .....	1,200.00

The appropriation and cost of these works will be found in the statement entitled, "Works in process of execution."

## DISTRICT OF PUERTO PRINCIPE.

*Construction of a canal at Minas.*—Consisting of excavating 1,500 square meters of gravel and pebble stone and the construction of two culverts, made of wood. Appropriations included in requisition for funds, approved July 18, 1900, and October 13, 1900, \$1,650. Total amount expended on the works to date, \$1,200.

## DISTRICT OF SANTIAGO DE CUBA.

Repairing completely the government wharf at Caimanera (Guantanamo), 67.10 meters in length by 8 meters wide at the narrowest portion of the bridge, and 67.40 meters in length and 18 meters wide in its other portions, making a total length of 134.10 meters. It is constructed on native hard-wood piles, the platform and string pieces of the same material. This work was done by contract, the price agreed upon being per unity. Appropriation granted February 16, 1900, \$15,587.12; increased, July 9, 1900, \$10,000; total, \$25,587.12; total amount expended on works, \$25,249.65.

*Statement of works in process of execution on January 31, 1901.*

## DISTRICT OF HABANA.

*Repairing kilometers 8 to 11 of the highway to San Cristobal.*—Consisting of metaling, in its greatest part worn off, being laid on about 0.235 meter in thickness toward the center and 0.125 meter on the sides, consuming probably 4,100 cubic meters of broken stone, taking as a basis the width of the road, 5.5 meters, together with the necessary rolling, spreading of binding material, and sprinkling. The stone necessary will be furnished by contract, and the balance of the work done by department labor. Appropriation granted May 12, 1900, \$14,073; total amount expended to date, \$13,863.34.

*Repairing Canongo Bridge at kilometer 5 of the San Cristobal highway.*—Consists in substituting the metallic truss by another of the Warren system. Bids were open to the public on February 4. Appropriation granted October 12, 1900, \$10,000; total amount expended on the works to date, \$24.52.

*Repairing road from Punta Brava to Cangrejeras.*—This road has a length of 3,340 meters. The dimensions adopted for repairing are 4.50 meters for the roadway, 0.75 for walks on either side, and 1 meter for each side drain, or a total of 8 meters wide. The macadam metaling is being prepared with a uniform thickness of 0.20 meter, which will be reduced to 0.16 meter after it is rolled, covering it with a layer 0.02 meter thick of binding material. The masonry work consists of two pipe culverts 0.60 meter in diameter, and a culvert having a span of 1.50 meters, on which the only improvement required is to renovate the flooring, add to it small wing walls, and plaster the abutments. The stone is furnished gratis by the residents of the locality, but its crushing is to be paid by the government. The work is being accomplished by department labor. Appropriation granted December 18, 1899, \$7,600; increase of same on June 14, 1900, \$2,600; total, \$10,200; total amount expended on work to date, \$9,337.66.

*Repairing highway from Batabano to Surgidero.*—The section under repair is 3,620 meters in length; width of road, 6 meters for the first 300 meters and 4.50 the rest of the distance, the walks being 0.75 meter wide. It is being completely remetaled, with a medium thickness of 0.25 meter at the center and 0.16 on the sides. This work is being done under contract by Messrs. Sussdorf, Zaldo & Co., at the rate of \$3 per linear meter. Appropriation granted May 31, 1900, \$15,000; total amount expended on the works to date, \$9,097.67.

## DISTRICT OF PINAR DEL RIO.

*Repairing kilometers 33 to 38 of the San Cristobal highway.*—Consisting in renewing the metaling, 5 meters wide, the thickness not to exceed 0.25 meter at the center and 0.15 meter on the sides, with the corresponding rolling and spreading of binding material. As there are about 3,017 cubic meters of stone acquired and near the work, the only items shown in the estimate for this work are 855 cubic meters of stone to be purchased and the amount necessary to cover the crushing of 255.5 cubic meters of the stone already obtained. The repairs include arrangement of the side-walks and drains. The stone is being purchased by contract and the balance of the work done by department labor. Appropriation granted February 28, 1900, \$6,118.48; total amount expended on the works to date, \$4,395.49.

*Repairing, construction, and reconstruction of bridges in the province of Pinar del Rio.*

*Bayate bridge.*—At kilometer 79 of the San Cristobal highway on wooden trestle bents, with four spans, and having a total length of 27.70 meters and width of 5.75 meters. The work being done consists of replacing the flooring with pine boards 0.075 meter thick. Appropriation granted December 4, 1900, \$300; total amount expended on works to date, \$262.



*Bridge over Feo River.*—On the road known as Ingenio, municipal district of San Luis. It is 33 meters in length and 4.40 meters in width. The work being done is repairing of the flooring and railings, and the placing of guard rails, painting, and resurfacing with stone the approaches to the bridge (about 20 cubic meters.) The material used for flooring is pine boards. Appropriation granted December 4, 1900, \$512.44; total amount expended on works to date, \$319.30.

*Marcos Vasquez bridge.*—On the road from Consolacion del Sur to Colon. This bridge is of iron with a span of 28.10 meters and 5.60 meters in width across the platform. The repairs being made consist in substituting several sections of the flooring where the boards are worn out by others in good condition, painting the rails, guard rails, and sections of the flooring with two coats of tar, and in scraping all the metal parts and putting on two coats of oxide of iron. Appropriation granted September 1, 1900, \$1,100; total amount expended on the works to date, \$1,020.99.

*Bridge on Bagazal Creek.*—On the road from Guane to Paso Real, formed by six rows of piles supporting four rows of longitudinal stringers which form part of the platform and the corresponding railing. It is 25.60 meters in length; it has five spans and the platform is 4.60 meters wide. The repairs being made consist in replacing about 10,269 feet of pine boards, in painting the whole bridge with tar, and in putting in good condition the approaches to the bridge. Appropriation granted September 10, 1900, \$2,950.84; total amount expended on the works to date, \$1,648.61.

*Construction of highway from Consolacion del Sur to the station of the same name on the line of the Western Railroad.*—This work was begun by the military engineers and was delivered to this department on July 1 of last year. The total length of the highway is 3,157 meters, and it is estimated that some 2,300 cubic meters of stone will be needed for the metaling, of Telford macadam, 5 meters wide. In the section constructed it will be necessary to clean out the side drains, patch the road, modify the grading, and widen the embankments. The stone is purchased by contract. Appropriation granted November 2, 1900, \$14,000; total amount expended on works to date, \$5,518.31.

#### DISTRICT OF MATANZAS.

*Repairing highway from Matanzas to Canasi.*—This road is about 32 kilometers in length, and average width of 9 meters. The repairs consist in modifying its gradient, metaling of macadam, and construction of the necessary culverts to cross water courses, among the latter the Yumuri River. To date the stone has been purchased by contract and the work done by department labor. It has been decided that in future the works on this road will be advertised for public bidding, an estimate being prepared for each section, consecutively. Appropriation granted October 24, 1899, \$32,000; increase to same June 14, 1900, \$8,000; increase, July 14, 1900, \$32,000; total, \$72,000; total amount expended on works to date, \$65,720.

#### DISTRICT OF SANTA CLARA.

*Repairing road from Caunao to Manicaragua.*—This road is about 50 kilometers in length, and the repairs consist in cleaning road, opening side ditches, crowning, removal of large rocks, drainage, metaling 25 kilometers, excavations for widening road, and constructions of over 30 works, including bridges, pontoons, and culverts. The bridges and pontoons are being built by contract, and the rest of the work by department labor. The metaling by sections will be advertised for public bidding. Appropriation granted October 16, 1889, \$5,000; increase granted November 3, 1900, \$75,000; total, \$125,000.

*Repairing road from Placetas to Sancti Spiritus.*—Approximate length, 67 kilometers. The work consists in cleaning the road and putting it in good condition, metaling the portions that may be necessary, and in constructing bridges, pontoons, culverts, and drains, and to date the projects have been prepared and approved for steel bridges for Tuinicu River, already offered at public bidding and awarded for \$26,004.73; and for a brick culvert, and three wooden bridges on the first section of said road, which will be advertised for bids to be opened on March 18, proximo, and have been estimated at \$10,706.70. (In the total amount stated as expended on works on this road is included the \$26,004.73 set aside for the Tuinicu bridge.) Appropriation granted November 15, 1899, \$80,241.50; total amount expended on works to date, \$50,201.51.

*Construction of highway from Trinidad to Condado.*—To consist of about 22 kilometers, following with slight modifications the direction of the road which exists at present between said points, grading it as may be found necessary. The metaling will be of macadam, 5 meters in width, with a bridge to be constructed over the Ay River, with a central span of 35 to 40 meters, and several pontoons, culverts, and drains. Appropriation granted December 11, 1900, \$5,000; total amount expended to date on the works, \$220.60.

*Repairing streets of the city of Sancti Spiritus.*—Consists in paving them in the same manner as are all the others of the city, except the portions adjoining the Central Park, where the paving will be of macadam. Appropriation granted November 2, 1900, \$25,000; total amount expended to date on the work, \$1,028.48.

*Laying pipes for carrying water from Trinidad to Casilda.*—The pipes are 3 inches in diameter, and about 19,000 feet will be used. Appropriation granted December 1, 1900, \$3,300; total amount expended on the works to date, \$1,333.15.

## DISTRICT OF PUERTO PRINCEPE.

*Repairing road from Nuevitas to San Miguel.*—Approximate length, 25 kilometers. The repairs consist in metaling the road, for which it will have to be graded anew, and in constructing the bridges, culverts, etc., to date, the project having been prepared for a wooden bridge on masonry piers, with a span of 38 meters, to cross the Saramaguacan River, at an estimated cost of \$11,000. Appropriations granted in requisitions for funds: July 18, 1900, \$2,000; September 18, 1900, \$2,000; total, \$4,000; total amount expended on the works to date, \$3,548.78.

*Repairing and constructing 17 bridges in the province.*—Contract for their construction entered into with Mr. Sacramento Zayas November 19, 1900, as follows: Repairing wooden bridges and masonry piers over Piedras, Hicapos, Blanco, Urabo, Platano, Burro, and Lazaro creeks on the road to Habana, and over the Imias and Sibanicu creeks on that to Santiago de Cuba; repairing the masonry bridges on roads leading out of the city, known as the Mendez, Cascorro, Santa Cruz, Juan de Toro, and Tinima bridges; construction of hard-wood bridges with masonry piers over the La Yaba creeks on the road to Santa Cruz and Seibabo on the road to Jaguey; reconstruction of the wooden superstructure of the bridge over the Cascorro River on the road to Santiago de Cuba and repairing the piers. Appropriation granted August 2, 1900, \$18,000; total amount expended to date on the works, \$1,782.20.

Repairing roads leading out of Puerto Principe, as follows:

*Road to Santa Cruz.*—Projects for bridges, culverts, etc., being studied, the projects for two wooden bridges with masonry piers having been approved, with a span of 25 meters, each one to cross the Contramaestre and Guariao creeks on said roads. Appropriations granted: July 18, 1900, \$2,000; September 19, 1900, \$2,500; October 13, 1900, \$3,750; November 24, 1900, \$7,500; total, \$15,750; total amount expended on the works to date, \$15,691.16.

*Road to Santiago de Cuba.*—One hundred and two kilometers in length, approximately. Repairs consist in metaling the road, about 5 meters wide, after the necessary grading has been done, and in the construction of bridges, culverts, etc., that may be found necessary. Appropriation granted November 6, 1900, \$32,000; total amount expended on the works to date, \$5,091.74.

## PROVINCE OF SANTIAGO DE CUBA.

Removing dam formed in the Buey River at Veguitas (9,158.41 cubic meters of materials causing the obstruction). Total amount expended on the works to date \$1,102.82, charged to the appropriation for general surveys in the district.

*Works for which plans have been prepared and appropriations made and about to be commenced or advertised for bids.*

## DISTRICT OF HABANA.

Repairing Guines highway between Cuatro Caminos and La Canoa; contract awarded at public competition to Mr. Miguel Gonzalez on January 8, 1901. Appropriation granted October 1, 1900, \$12,500.

*Pumping station at San Nicolas.*—The bids for these works were opened February 18, 1901, only one proposition being presented, by Messrs. Sussdorf, Zaldo & Co., which could not be considered on account of being greater than the appropriation made for that purpose. Appropriation made December 6, 1900, \$3,131.62.

*Repairing kilometers 5 to 15, Luyanó to La Gallega.*—Bids were opened February 20, 1901, for the said kilometers, with the exception of the tenth, and awarded to Mr. Juan Embil. Appropriation approved December 1, 1900, \$34,882.

*Repairing and constructing stables at the house Cerro 440 B.*—This work was commenced last February by department labor. Appropriation made November 7, 1900, \$1,002.

*Construction of highway from Rincon to San Antonio de los Baños.*—Advertisements, specifications, and propositions for bids approved February 26 last. Appropriation granted December 12, 1900, \$50,000.

## DISTRICT OF PINAR DEL RIO.

*Highway from Cabanos to Bahia Honda.*—With the project approved for completing the construction of the section of 3,600 meters. The grading will be done by administration labor and the metaling by contract. Appropriations granted: In the requisition for funds approved July 18, 1900, \$9,000; on January 26, 1901, \$27,000; total, \$36,000.

*Construction of a steel bridge over Galiano Creek, on the road from Pinar del Rio to San Juan y Martinez.*—Bids for this work will be opened February 28, 1901. Appropriation made December 4, 1899, for this and other bridges, \$42,608.42, which includes also other bridges already specified in the statement entitled 'works finished.'

## DISTRICT OF MATANZAS.

*Dredging Cardenas Harbor.*—The bids for these works were opened January 31, 1901, but the contract has not yet been awarded. Appropriation made October 15, 1901, \$300,000.

*Construction of highway from Matanzas to Cidra.*—The project for the first 3 kilometers has been prepared. Appropriation made January 23, 1901, \$29,000.

*Repairing bridge over Conclusion Creek, on the road from Palmillas to Colon.*—The preliminary project of this work has been approved, and on December 7, 1900, instructions were given for the preparation of the definite project. Appropriation made December 10, 1900, \$1,100.

## DISTRICT OF SANTA CLARA.

*Ferry for the Manati River at Trinidad.*—The definite project for the construction of this ferry was approved February 18, 1901, as also the advertisement and specifications for awarding the contract at public competition, which will take place March 22, 1901. Appropriation approved June 11, 1901, \$4,000.

*Works on the approaches to the Damuji bridge.*—Bids for awarding this contract were opened January 15, 1901, Mr. Emilio del Monte being the lowest bidder, to whom the contract was awarded. Appropriation approved November 6, 1900, \$2,900.

*Construction of four bridges over Ahocinado Creek.*—On December 4 the preliminary project for this work was approved, and instructions were given for the preparation of the documents necessary to advertise them for public bidding. Appropriation approved December 1, 1900, \$6,860.

*Metaling 12 kilometers of road between Caunao and Guaos.*—The documents are being prepared to advertise for public bidding the metaling of the first 6 kilometers.

## DISTRICT OF PUERTO PRINCIPE.

*Metaling 6 kilometers on the road to Santiago de Cuba.*—These works are being prepared, and for this purpose 4,500 cubic meters of broken stone have been contracted for January 19, 1901, from Mr. Jose L. Luaces, at the rate of \$2.19 per cubic meter.

*Repairing 4 kilometers of highway from Puerto Principe to Cubitas.*—An examination of the road has been made and the plant of the works approved January 1, 1901. The latter consists in widening the road, blowing up obstacles, refilling, opening old side ditches, and construction of culverts. Appropriation approved October 1, 1900, \$1,500.

*Construction of bridges on the Saramaguacan River and Contramaestre and Guareao creeks.*—Saramaguacan bridge will be built of wood and iron combined, Pratt system, with masonry piers, having a span of 38.5 meters and a width of 5.25 meters. Contramaestre and Guareao bridges will be of wood, Howe system, 25.2 meters long by 5.25 meters wide, with masonry piers. The opening of bids for all the bridges is advertised for March 30, 1901. Appropriation approved December 4, 1900, \$21,400.

## DISTRICT OF SANTIAGO DE CUBA.

*Construction of two bridges on the highway from Cristo to Boniato.*—One to be placed over the Mao Creek; it will be of steel, on masonry piers, Warren system, 13.20 meters long by 5.18 meters wide, bids to be opened on March 4, 1901. The other will be placed over the Aguacate River, and is also to be of steel on masonry piers, same system, having a length of 18.5 meters by 5.18 meters, bids to be opened February 28, 1901. Appropriation approved October 12, 1900, \$1,200.

*Construction of two kilometers of highways from Boniato to Cristo.*—On February 9, 1901, bids were opened for the construction of 1,700 linear meters and the contract awarded to the highest bidder, Mr. R. S. Porro, on the 19th of the same month. Appropriation approved October 12, 1900, \$12,000.

*Statement of works under consideration, or in which projects are being prepared, and the expenses thereby incurred charged to the fixed appropriation included in the annual budget, for study and preparation of projects, in each district, approved July 17, 1900, except in the cases below specified.*

*District of Habana.*—Road from Cano to Wajay; road from Nueva Gerona to Santa Fe (Isle of Pines); surveys on road from Managua to Batabano.

*District of Pinar del Rio.*—Repairing piers of bridge over San Cristobal River; bridge over Trancas Creek; studies in connection with Papayas bridge; studies in connection with culverts on the road of Puerta de la Guira to the highway of San Cristobal; road from Bahia Honda to Consolacion del Norte; surveys on road from Pinar del Rio to Guane; surveys on road from Luis Lazo to Corojo and from Luis Lazo to San Juan; bridge over Ajiconal River; San Sebastian bridge; bridge over Guao Creek; Capellania bridge; bridge over Paso Viejo River; bridge over Guayabo River; bridge over Magueyes Creek; studies in connection with the Ovas bridge; studies in connection with bridge over Guasimal River; studies in connection with bridges over Hediondo and Jagua creeks; studies in connection with bridge over the Cuyaguaje, in the district of Mulo; studies in connection with bridge over the Cuyaguaje River at Cabezas; studies in connection with bridge over the Cuyaguaje River at Guane; studies in connection with bridge over Galafre River; studies in connection with bridge over Mantua River; studies in connection with bridge over Santa Clara River; studies in connection with bridge over Herradura River; studies and preparation of projects of the last-named 17 bridges are being made, with expenses resulting from same charged to the appropriation of \$3,500, approved October 10, 1900.

*District of Matanzas.*—Bridge over San Juan River; studies in connection with bridge in Cardenas Harbor; studies in connection with bridge over Palma River; drainage of lands subject to overflow at Roque, under a special appropriation of \$250 approved June 14, 1900.

*District of Santa Clara.*—Santo Domingo aqueduct; surveys on road from Placetas to Trinidad; surveys on road from Remedios to Caibarien; surveys on highway to Camajuani; surveys in connection with drainage of the town of Camajuani.

*District of Puerto Principe.*—Repairing Fundicion bridge; surveys on highway to Santa Cruz; studies in connection with improvement works at Seibabo Creek.

*District of Santiago de Cuba.*—Road from Santiago de Cuba to Holguin; studies in connection with bridges in the province; studies in connection with the construction of a government wharf at Baracoa; studies in connection with the reconstruction of the bridge at Gibara.

In view of the difficulty in obtaining large appropriations for the purpose of undertaking works on a large scale, and with the object of at least making the roads now existing passable at all seasons of the year, I have directed my efforts mainly to the construction of bridges, as may be seen by the statement made of works for which surveys are being made and in process of construction in the different districts of the island, and which is herewith inclosed.

With respect to the construction of bridges the situation is analogous to that of highways; large contractors from the United States have called at this department disposed to contract for the construction of bridges. This department considers it advisable that the contractor of a bridge shall be likewise contractor for the foundations, supports, and frame, and for the construction of a bridge that bidder is to be preferred who will contract to execute the work complete, even though his estimate should be somewhat higher, rather than to contract for the construction separately of the different parts of a bridge. With this understanding, besides the surveys which separately are being made in the different districts, there exists in the district of Pinar del Rio a bridge projecting party appointed exclusively for the purpose of surveying the principal bridges of the district, so that all the plans once prepared the construction of all of them may be contracted for simultaneously on the most advantageous terms to the department.

Several buildings have been repaired by the architect division and others are in process of conclusion, the most important being the hacienda building. In the latter, besides many necessary repairs, a new meteorological observatory has been built, used as the office of the United States Weather Bureau. The same division has also commenced the new building for the school of arts and trades. During the Spanish régime the building used for the workshops was constructed and the building in which to locate the school hall was begun, but subsequently suspended. Upon steps being taken lately to continue the work it was found that the wall of the building, at the corner of Belascoain and Sitios streets, was cracked, due to defective foundations, and upon other parts of the foundations being examined the same defects were discovered. For this reason, and from the fact that the building originally was

located 0.40 meters out of the building line toward the street, it was necessary to lay new foundations, which is now being done. The new foundation is of concrete on juncaro piles, with crib work of the same hard wood.

In the report for the year ending June 30, 1900, the construction of highways was recommended among the works to which preference should be given, and accordingly the surveys for several of the latter were begun, extending them over long distances, in the expectation that when advertising for bids to construct same the contracts would cover long distances, whereby, besides the great amount of work which would be executed, the contractor's prices could be made relatively lower. To carry this into effect, however, it would have been necessary to make appropriations involving large amounts of money, the disbursement of which, from the nature of the works, would have been slow, and the noninvestment of such funds would affect the public treasury. Several surveys of this nature have been made, requiring months of work, following the end at first proposed, but at present, and in order not to affect the public treasury of the island to the extent of larger amounts than are actually necessary to keep up with the progress of the works, it has been necessary to survey small sections of 3 and 4 kilometers on the most important roads and make small contracts for carrying them out. This system presents the objection, in executing works by contract, that it reduces the number of bidders, for the reason that such works require a considerable amount of expense at their commencement, materially reducing or entirely consuming the contractor's profit, who, under present conditions, has to look forward to the granting of new appropriations with which to construct consecutive sections as his only source of profit; and even if the latter should be the case the possibility exists—as for each section there is a new call for bids—that a competitor may underbid him for the new contract, for all of which reasons the bidders are few and the bids small for this class of work.

The work done in the hacienda building, since May 17, when it was begun, to December 31, 1900, is as follows:

Work.	Personnel.	Materials.	Totals.	
New building, United States Weather Bureau:				
Masonry work .....	\$2,438.23	\$1,669.87	\$4,108.10	
Carpentry work .....	629.27	345.90	975.17	
Painting .....	680.91	109.65	790.56	
				\$5,873.83
Repairs:				
Tearing down .....	457.04		457.04	
Masonry work .....	9,300.93	6,621.21	15,922.14	
Carpentry work .....	4,020.31	4,184.19	8,204.50	
Painting .....	4,331.52	3,471.35	7,802.87	
Miscellaneous .....	1,054.67	1,335.28	2,389.95	
				34,776.50
Pumping and sanitary work done by contract .....		6,900.00		
Additional contract .....		1,266.00		
				8,166.00
Direction and inspection .....		1,360.00		1,360.00
Total .....				50,176.33

Just at present the construction of an interior gallery is being finished, on a level with the mezzo story, for the purpose of facilitating communication between the different offices on the same floor, without it being necessary to go through these offices, thus disturbing the office force in each. The construction of a passenger elevator, which will make the offices in this building easy of access, will practically complete the most urgent repairs that were necessary. Work was commenced at the school of arts and trades on November 8, 1900, and the following has been accomplished to December 31, 1900:

Work.	Work done.	Cost.
	<i>Cubic meters.</i>	
Tearing down walls .....	2,012.54	\$932.61
Tearing up foundations .....	638.25	351.04
Excavating, cleaning, pumping, and shoring .....	1,553.30	776.71
Piles, 16 .....		222.62
Construction pile driver No. 1 .....		279.83
Transportation .....	883	220.75
Broken stone .....	183	98.82
Direction and inspection .....		99.26
Total .....		2,981.64

Several other small repairs have been made on state property, as follows:

At the academy of painting.....	\$628.97
At the house Cardenas street, No. 40.....	226.00
At the house Anton Recio street, No. 86.....	626.00
And on December 29, 1900, the repairs were begun on the house Someruelos street, No. 27, estimated at .....	418.00

*Statement of the appropriations, allotments, and expenditures incurred during the six months ending December 31, 1900.*

## CENTRAL OFFICE.

Allotments.	Appropriations approved and transferred.	DR.			CR.			Balances on Dec. 31, 1900.
		Monthly allotments for the last six months.	Reimbursements made.	Total.	Paid out during the six months.	Turned in to the treasury.	Total disbursed.	
Office of the secretary:								
Personnel.....	\$13,300.00	\$6,649.98	.....	\$6,649.98	\$6,070.69	.....	\$6,070.69	\$579.29
Office material.....	1,050.00	600.00	.....	600.00	548.59	.....	548.59	51.41
Government buildings bureau:								
Personnel.....	5,340.00	2,670.00	.....	2,670.00	2,670.00	.....	2,670.00	.....
General surveys.....	6,000.00	3,000.00	.....	3,000.00	946.25	.....	946.25	2,053.75
Repairs:								
Hacienda building.....	63,071.83	62,121.83	.....	62,121.83	42,033.12	.....	42,033.12	20,088.71
State buildings.....	4,718.00	3,000.00	.....	3,000.00	1,915.19	.....	1,915.19	1,784.81
House in Sancti Spiritus, No. 3								
Maximo Gomez street.....	3,200.00	3,200.00	.....	3,200.00	2,166.34	.....	2,166.34	1,033.66
Construction school arts and trades.....	61,500.00	20,000.00	.....	20,000.00	2,142.90	.....	2,142.90	17,857.10
Government buildings bureau, office material.....		1.50	.....	1.50	1.50	.....	1.50	.....
Road maintenance, special appropriation.....	605.00	605.00	.....	605.00	558.60	.....	558.60	46.40
Secretary's office, material, printing.....	600.00	600.00	.....	600.00	595.50	.....	595.50	4.50
Accounts division, personnel.....	3,500.00	1,749.96	.....	1,749.96	1,749.96	.....	1,749.96	.....
Director-General:								
Personnel.....	14,500.00	7,249.98	.....	7,249.98	7,227.92	.....	7,227.92	26.06
Office material.....	950.00	693.05	.....	693.05	684.75	.....	684.75	8.30
General surveys.....	6,000.00	2,358.75	.....	2,358.75	823.60	.....	823.60	1,535.15
Survey Santa Clara waterworks.....	1,600.00	1,600.00	.....	1,600.00	.....	.....	.....	1,600.00
Railroads, inspection.....		210.00	.....	210.00	4.90	.....	4.90	205.10

## DISTRICT OF PINAR DEL RIO.

Office of chief engineer:								
Personnel.....	\$5,380.00	\$2,689.98	.....	\$2,689.98	\$2,689.98	.....	\$2,689.98	.....
Office material.....	300.00	156.55	.....	156.55	151.23	.....	151.23	\$5.32
House rent.....	720.00	360.00	.....	360.00	360.00	.....	360.00	.....
General surveys.....	12,000.00	5,700.00	.....	5,700.00	4,630.21	.....	4,630.21	1,069.79
Road maintenance.....	36,000.00	18,004.00	.....	18,004.00	14,522.20	.....	14,522.20	3,481.80
Installation bridges on rivers Hondo and Yaguasa.....		3,000.00	.....	3,000.00	2,682.58	.....	2,682.58	317.42
Repair kilometers, 33 to 38 San Cristobal road.....	5,618.48	5,618.48	.....	5,618.48	4,395.49	.....	4,395.49	1,222.99
Repairs, construction, and reconstruction bridges.....	22,401.54	13,007.86	.....	13,007.86	7,905.30	.....	7,905.30	5,102.56
Railroad inspection.....		25.00	.....	25.00	.....	.....	.....	25.00
Construction of road from—								
Consolacion del Sur to Western Railroad station.....	14,000.00	13,000.00	.....	13,000.00	3,752.46	.....	3,752.46	9,247.54
Cabanas to Bahia Honda.....		9,000.00	.....	9,000.00	8,269.60	.....	8,269.60	730.40

## Statement of the appropriations, allotments, etc.—Continued.

## DISTRICT OF PINAR DEL RIO—Continued.

Allotments.	Appropriations approved and transferred.	DR.			CR.			Blances on Dec. 31, 1900.
		Monthly allotments for the last six months.	Reimbursements made.	Total.	Paid out during the six months.	Turned in to the treasury.	Total disbursed.	
Repairs of bridge Bagazal .....	\$2, 950. 84	\$2, 950. 84	.....	\$2, 950. 84	\$1, 635. 02	.....	\$1, 635. 02	\$1, 315. 82
Repairs and painting bridge Marcos Vazquez .....	1, 100. 00	1, 100. 00	.....	1, 100. 00	44. 00	.....	44. 00	1, 056. 00
Bridges Pedernales Creek and San Cristobal River .....	2, 000. 00	2, 000. 00	.....	2, 000. 00	.....	.....	.....	2, 000. 00
Repairs bridge Bayate .....	300. 00	300. 00	.....	300. 00	.....	.....	.....	300. 00
Repairs bridge on river Feo .....	512. 44	512. 44	.....	512. 44	.....	.....	.....	512. 44
Projects of bridges .....	3, 500. 00	1, 750. 00	.....	1, 750. 00	467. 30	.....	467. 30	1, 282. 70

## DISTRICT OF HABANA.

Office of chief engineer:						
Personnel	\$5,380.00	\$2,689.98	\$2,689.98	\$2,689.98	\$2,689.98	
Office material	300.00	150.00	150.00	130.26	130.26	\$19.74
General surveys	12,000.00	4,500.00	4,500.00	4,491.16	4,491.16	8.84
Roads:						
Maintenance	51,600.00	25,800.00	25,800.00	19,503.82	19,503.82	6,296.18
Special appropriation	450.00	150.00	150.00	85.50	85.50	64.50
Railroad inspection		25.00	25.00			25.00
Repairing of ruts on road from Luyano to Gallega		1,000.00	1,000.00	1,000.00	1,000.00	
Repairs:						
Kilometers, 20 to 21, Guines road	5,101.15	1,884.45	1,884.45	1,798.78	1,768.78	85.67
Kilometers, 25 to 27, Guines road	3,435.27	3,435.27	3,435.27	3,433.55	3,433.55	1.72
Kilometers, 12 to 20, Arroyo Apolo to Managua	17,441.35	17,441.35	17,441.35	14,123.27	14,123.27	3,318.08
Kilometers, 8 to 11, San Cristobal road	10,369.83	10,369.83	10,369.83	9,794.21	9,794.21	575.62
Kilometers, 3 to 5, San Cristobal road	8,116.10	8,117.10	3,117.10	8,117.10	8,117.10	
Kilometers, Punta Brava Cangrejeras road	7,600.00	6,500.00	6,500.00	4,577.35	4,577.35	1,922.65
Batabano to Surgidero road	15,000.00	9,600.00	9,600.00	2,575.46	2,575.46	7,024.74
Pumping station at Santiago de las Vegas		200.00	200.00	.98	0.98	199.02
Guines road between Cuatro Caminos and Canoa	12,500.00	2,000.00	2,000.00	12.00	12.00	1,988.00
Pumping station at San Nicolas	3,131.62	3,131.62	3,131.62	1.50	1.50	3,130.12
Repairs on bridge Canongo	10,000.00	1,000.00	1,000.00			1,000.00
Repairs kilometers, 5 to 15, from Luyano to Gallega	34,882.00					
Repairs and construction stalls at No. 440 B., Cerro	1,200.00	1,200.00	1,200.00			1,200.00
Repairs Rincon to San Antonio de los Banos road	50,000.00					

*Statement of the appropriations, allotments, etc.—Continued.*

## DISTRICT OF MATANZAS.

Allotments.	Appropriations approved and transferred.	DR.			CR.			Balances on Dec. 31, 1900.
		Monthly allotments for the last six months.	Reimbursements made.	Total.	Paid out during the six months.	Turned in to the treasury.	Total disbursed.	
Office of chief engineer:								
Personnel.....	\$5,380.00	\$2,689.98		\$2,689.98	\$2,689.98		\$2,589.98	
Office material.....	300.00	152.50	\$2.50	152.50	127.42		127.42	\$25.08
House rent.....	360.00	174.00		174.00	174.00		174.00	
General survey.....	18,000.00	5,510.50	10.50	5,510.50	4,243.33		4,843.33	1,267.17
Railroads inspection.....		100.00		100.00	24.45		24.45	75.55
Repair Matanzas to Canasi road.....	33,504.51	33,490.71		33,490.71	26,472.08		26,472.08	7,018.63
Surveys of flooded lands at Roque.....	250.00	250.00		250.00	41.59		41.59	208.41
Surveys Matanzas to Cidra road.....		67.00		67.00	67.00		67.00	
Dredging Cardenas Bay.....	300,000.00							
Reconstruction bridge on Brook Conclusion.....	1,100.00							
Works of the new market house.....	30,000.00	2,000.00		2,000.00				2,000.00

## DISTRICT OF SANTA CLARA.

Office of chief engineer:								
Personnel.....	\$5,380.00	\$2,689.98		\$2,689.98	\$2,689.98		\$2,689.98	
Office material.....	300.00	150.00		150.00	139.00		139.00	\$11.00
House rent.....	360.00	174.50		174.50	143.58		143.58	30.92
General surveys.....	24,000.00	10,500.00		10,500.00	8,451.17	\$1.00	8,451.17	2,047.83
Railroad inspection.....		50.00		50.00	12.97		12.97	37.03
Repairs:								
Caunao to Manicaragua road.....	101,428.39	26,112.60		26,112.60	20,239.75		20,239.75	5,872.85
Placetas to Sancti Spiritus road.....	72,819.26	15,256.40		15,256.40	14,543.01		14,543.01	713.39
Construction bridge over River Damuji.....	17,296.57	17,296.57		17,296.57	17,296.51		17,296.51	.06
Barge for river Manati in Trinidad.....	4,000.00	4,000.00						4,000.00
Surveys of San Juan de las Yeras to Manicaragua road.....		191.81		191.81	191.11		191.11	.70
Reconstruction Santa Clara to Manicaragua road.....		56.12		56.12	56.12		56.12	
Construction Trinidad to Casilda road.....	15,495.00	16,192.78		16,192.78	13,001.13		13,001.13	3,191.65
Trinidad to Condado road.....	5,000.00	5,000.00		5,000.00				5,000.00
Works on the approaches of Damuji bridge.....	2,900.00	2,900.00		2,900.00	20.00		20.00	2,880.00
Repairs streets of Sancti Spiritus.....	25,000.00	2,500.00		2,500.00	5.80		5.80	2,494.20
Laying water pipes and carrying water from Trinidad to Casilda.....	3,300.00	3,300.00		3,300.00				3,300.00
Construction of 4 bridges on brook Ahocinado.....	6,860.00	2,286.00		2,286.00				2,286.00

## DISTRICT OF PUERTO PRINCIPE.

Office of chief engineer:								
Personnel.....	\$5,380.00	\$2,689.98		\$2,689.98	\$2,689.98		\$2,689.98	
Office material.....	300.00	153.75		153.75	150.10		150.10	\$3.65
House rent.....	480.00	240.00		240.00	240.00		240.00	
General surveys.....	18,000.00	7,550.00		7,550.00	6,789.76		6,789.76	760.24
Railroad inspection.....		25.00		25.00	4.80		4.80	20.20



*Statement of the appropriations, allotments, etc.—Continued.*

## DISTRICT OF PUERTO PRINCIPE—Continued.

Allotments.	Appropriations approved and transferred.	Dr.			Cr.			Balances on Dec. 31, 1900.
		Monthly allotments for the last six months.	Reimbursements made.	Total.	Paid out during the six months.	Turned in to the treasury.	Total disbursed.	
Repair of roads leading from—								
Puerto Principe City .....		\$15,750.00	\$0.31	\$15,750.31	\$15,691.16		\$15,691.16	\$59.15
Nuevitasto Puerto Principe road .....		4,000.00		4,000.00	1,908.81		1,908.81	2,091.19
Construction of canal at Minas .....		1,560.00	.61	1,560.61	1,199.97	\$360.64	1,560.61	
Repair and construction of bridges .....	\$18,000.00	2,500.00		2,500.00	2.00		2.00	2,498.00
Repair 4 kilometers, Puerto Principe to Cubitas road .....	1,500.00	1,500.00		1,500.00				1,500.00
Puerto Principe to Santiago de Cuba road .....	32,000.00	8,000.00		8,000.00			.05	8,000.00
Construction bridge on—								
River Saramaguacan .....	11,000.00							
Brook Contra-maestre .....	6,000.00							
Brook Guariao .....	4,400.00							

## DISTRICT OF SANTIAGO DE CUBA.

Office of chief engineer:								
Personnel .....	\$5,380.00	\$2,689.98		\$2,689.98	\$2,689.98		\$2,689.98	
Office material .....	300.00	150.00		150.00	150.00		150.00	
House rent .....	480.00	240.00		240.00	240.00		240.00	
General surveys .....	24,000.00	10,000.00	\$16.99	10,016.99	8,058.24		8,058.24	\$1,958.75
Wharves, personnel .....		50.00		50.00	37.50		37.50	12.50
Repairs of Caimanera wharf, Guantamano .....	23,587.12	23,587.12		23,587.12	20,744.13		20,744.13	2,842.99
Construction 2 bridges on Cristo to Boniato road .....	12,000.00							
Construction 2 kilometers, Boniato to Cristo road .....	12,000.00							
Railroad inspection .....		50.00		50.00				50.00

## RECAPITULATION.

Central office .....	\$185,934.83	\$116,310.05		\$116,310.05	\$70,139.81		\$70,139.61	\$46,170.24
Pinar del Rio .....	106,783.30	79,175.15		79,175.15	51,505.37		51,505.37	27,669.78
Habana .....	248,508.32	99,194.60		99,194.60	72,334.92		72,334.92	26,859.68
Matanzas .....	388,894.51	44,421.69	\$13.00	44,434.69	33,839.85		33,839.85	10,594.84
Santa Clara .....	284,139.22	108,656.76		108,656.76	76,790.13	\$1.00	76,791.13	31,865.63
Puerto Principe .....	97,060.00	43,968.73	.92	43,969.65	28,676.58	360.64	29,037.22	14,932.43
Santiago de Cuba .....	77,747.12	36,767.10	16.99	36,784.09	31,919.85		31,919.85	4,864.24
Total .....	1,289,067.30	528,494.08	30.91	528,524.99	365,206.51	361.64	365,568.15	162,966.84

NOTE.—In the \$16,192.78, second column, Trinidad to Casilda road, are included \$697.78 transferred by Lieut. W. A. Raibourn.

*Report referring to the works and surveys committed to this head office, and to every kind of expenses thereof, from July 1, to December 31, 1900, submitted to the secretary of the department in compliance with section 25 of the regulations for the government of the department of public works.*

PINAR DEL RIO, January 15, 1901.

MR. SECRETARY: If this report, which I have the honor to submit to your consideration, should be read over carelessly, the reader may come to the conclusion that the works accomplished by this head office during the present half year have

been of no utility; but if the matter is thoroughly examined and the special conditions of the province at the time being are kept in mind, it will be admitted that this head office has accomplished a toilsome labor, increased by the lack of expert assistants. Certainly very few works have been materially performed, but at the same time many surveys have been made which will place this province at the head of those executing works, if the necessary appropriations for same are conceded.

#### WORKS ACCOMPLISHED.

##### BRIDGES REPAIRED, BUILT, AND RECONSTRUCTED.

*Road to Vinales.*—Reconstruction of the bridge across river Guama. At the installment of this head office it was necessary to make, for the benefit of public traffic, some provisional repairs on this bridge, which was in a ruinous state, its complete repair not having been accomplished at once because a preferent attention was given to those on the road to San Juan y Martinez. Immediately after finishing these works the repair of bridges across rivers Paso Viejo and Ajiconal was commenced. The former of these is situated on the road to Vinales, and the latter on the road to Consolacion del Sur. All these works were effected during the first six months of last year, and were included in the corresponding report.

In the first ten days of July the gang of carpenters, under the direction of Master Builder Mr. Margeli, started for the place to carry on the necessary work. As I have said, this bridge was in a ruinous state, and, with the exception of the palisade, it was necessary to replace all its pieces and to add some more to securing stability. The works lasted three months, and 64,977 feet B. M. of yellow pine from the North were employed. The total cost amounted to \$4,926.80 United States currency.

*Road from Pinar del Rio to San Juan y Martinez; bridge across creek Trancas.*—With the object of building a permanent bridge over this creek, a gang was dispatched on the 15th of July to a near-by quarry yielding stones of excellent qualities to extract the necessary for building the abutments. Notwithstanding, after a careful investigation of the conditions of the creek and after having redacted three different fore-projects, all of which, without offering the greatest conditions of viability, exceeded the amount assigned, it was agreed in the last days of September to suspend the works, having been extracted up to that 307 cubic meters of stone at a cost of \$445. This stone is deposited in the quarry ready to be used in the construction of the bridge. In October a new survey was made, and the certainty of the impossibility of the execution of the works within the provided limits once ascertained, the director-general was consulted whether it would be considered convenient to postpone this survey until the definitive of the highway to San Juan y Martinez was carried on, considering that a provisional bridge existed, which, though not in very good condition, was at all events passable. The postponement was approved by the director-general.

*Road from Guane to Paso Real; bridge across creek Bagazal.*—On the 21st of August the project of reconstruction of this bridge, amounting to \$2,950.84, was forwarded to the director-general. It was approved on the 6th of September and the appropriation was granted on the 14th of the same month. In this bridge all the superstructure had to be replaced, adding some struts and braces to diminish the excessive span between palisades. Some ties were also added. All the timber employed was of this country, of the kind known as hard wood. Seven thousand six hundred and sixty-five feet of this timber in planks, struts, tiebeams, and pieces for the railing was contracted from Mr. Manuel Gonzalez at \$60 United States currency per 1,000 feet at the place of job. The string and straining pieces, 1,680 feet, were donated by the owners of the woods called San Julian, and the cutting was done by the personnel of the job. The cost of these pieces was \$62.20 United States currency per 1,000 feet. Four hundred pounds of nails, bolts, screws, etc., was used, and the bridge was given two coats of asphalt. The works commenced on the 8th of November and were ended on the 22d of December, being employed 1 master carpenter, 1 timekeeper, 5 carpenters, 7 helpers, 1 teamster, and 1 large wagon with 2 teams of mules. The total cost amounted to \$1,643 United States currency; therefore \$1,038 remained unemployed.

*Road from Consolacion del Sur to Colon; bridge Marcos Vazquez across river Ajiconal.*—On the 5th of December the project for repair of this bridge was forwarded, having been approved on the 12th of same month. An appropriation amounting to \$1,100 United States currency was granted for the works. This is an iron bridge with wooden platform, and the repairs will consist in the replacement of the platform and railing and of some string beams which are in bad condition, repairing at the same time the support of beams and paving the approaches, which are badly destroyed. The works were commenced on the 27th of December with the same gang employed on bridge Bagazal, with one painter and one assistant more. Up to the 31st of Decem-

ber the works performed consisted in tearing up the wooden portion which is to be replaced and the scratching of old paint on the iron parts commenced. The total amount expended up to the last of December was \$835 United States currency.

*Highway from Consolacion del Sur to the Western Railroad station.*—On the 15th of June a communication from the military engineer, U. S. A., in charge of the works of said road, was received at this head office, announcing that on the 1st of July the works would be turned over to the department. The necessary authorization once obtained, on the 1st of July took place the reception of the works effected, which according to measurements and act drawn were as follows: One portion 304 meters long, finished; another of 30.40 of natural soil; another 500 meters long with binding consolidated; 16 meters of natural soil; 181 meters with first coating and binding not consolidated; 1,048 meters with first coating not consolidated; 67 meters, half first coating and half embankment; 64 first coating with no binding and 755 meters of embankment. Existed, besides, one culvert built up of masonry and another one of rails, supported by masonry walls, constructed during the Spanish régime, and nine more made of yellow-pine planks by the military engineers. On the 4th of July the works were continued by administration, going on with the spreading of the first coating, quarrying the necessary stone, also by administration. On the 10th of August the works were suspended on account of an order to prepare the corresponding project for finishing the road, dictated by the director-general. Up to that date the works effected consisted in 530 meters of first coating spread and 922 cubic meters of stones extracted. The total amount of expenses was \$2,618 United States currency. The deceased engineer, Mr. Sola, redacted on the 30th of August the project for the completion of the road, the estimate amounting to \$24,309.11 United States currency, including the substitution of the wooden culvert by others built up with stones. As the stone found in the vicinity is too soft to be used in the second coating, the cubic meter of this material was estimated at \$3, with the idea of obtaining it from better quarries situated at a greater distance.

On the 19th of September the project was returned by the director-general for new redaction, expressing the substitution of culverts and reducing the prices of stone. On the 25th of September a new project was forwarded, the estimate thereof amounting to \$14,094.59, which was approved on the 15th of October, authorizing the work to be carried on by administration, contracting by public auction for the stone required for the second coating. On the 8th of November the honorable military governor granted an appropriation of \$14,000, and the general plan of works submitted by this head office on the 7th of December having been approved, the works were continued again on the 10th of same month. The expense originated by the vigilance and keeping up of the works during the four months of paralyzation amounted to \$1,129.47 United States currency.

The works performed during the month of December consisted in the grading of footpaths, with the object of accommodating the cross section of the road to the official model adopted by the department, leaving at the same time sufficient road-bed for the spreading of the second coating. The quarrying of the necessary stone for finishing the first coating has been carried on at the same time. The amount of work effected is as follows: One thousand two hundred and sixty-one meters of grading of footpaths, with a cost of \$228.96, the linear meter resulting at 19½ cents. The amount of stone extracted was 244.50 cubic meters, at a total cost \$323.48, the cubic meters resulting at \$1.32 United States currency. The personnel of this work is: One inspector, 1 timekeeper, 1 foreman, 4 teamsters, 1 harness maker, and 34 laborers.

On the 20th of December the public bidding for the acquisition of the necessary stone for the second coating took place, and, as it was presumed by this office at the time of redacting the first project, it had to be declared of no effect, as the only bid made greatly exceeded the estimated price. The gathering of this stone will be done by administration, and it can be assured that the stone will be of bad condition or an increase of credit will be necessary. The scarcity of laborers is a constant drawback to the progress of works, nevertheless it is expected that these works of great necessity to the country around will be finished by the ending of the present harvest.

*Highway in construction from Cabanas to Bahia Honda and La Playa.*—On the 1st of July the reception of this work, in charge until then of the engineers of the intervening Government, was ordered by the secretary of the department. In compliance with this order Señor Agramonte, engineer of the district of Guanajay, provisionally took said works in charge on the 4th of July, without making an inventory or drawing an act of reception, the works being continued under the supervision of Señor Darnell, engineer appointed to the effect. These works were suspended on the 10th of August by order of the director-general, with the object of preparing the corresponding project for the termination of same. There are no exact data in this office in reference to the works finished and the cost thereof.

Senor Darnell, assisted by the necessary technical personnel, commenced from the 10th of August the survey for the termination of this highway. The field work was finished on the 30th of September, and the personnel commenced the redaction of the corresponding projects, of which that referring to the portion from Bahia Honda to La Playa is already pending approval of the higher authorities, and that referring to the portion from Cabanas to Bahia Honda is at this office for examination. The length of the highroad from Cabanas to Bahia Honda will be about 32 kilometers, 10 kilometers more having been surveyed in one deviation. The total number of kilometers surveyed was 44, including 2 kilometers of the branch to La Playa. The cost of this branch will amount to \$5,103.42 United States currency, and the highway from Cabanas to Bahia Honda to \$300,000, approximately. The total expenses of works and surveys up to the end of the year amounted to \$9,062 United States currency.

On the 26th of August the undersigned drafted an act in the presence of the municipal mayor of Cabanas, and some respectable citizens of the town as witnesses, as no employees of the intervening government were present, in reference to the state and measurement of the works accomplished.

The works performed are the following: Parting from the town of Cabanas, 3,180 lineal meters of embankments of different heights and 420 meters of cuttings, among which are 725 meters with the first coating of stone merely scattered, which must be gathered and spread again. There exist also four masonry culverts with platforms of rails and two wooden bridges (yellow pine) one 11 and the other 7 meters stretch, all this on the portion starting from Cabanas. In the portion near Bahia Honda the works performed were as follows: 1,058 meters of embankments of different heights and 530 of cuttings. The remainder of the grading up to 37.40 meters is found with the ditches digged and the earth therefrom shoveled upon the road. There exist also 5 culverts built of masonry and rails. In this portion of the road there is no roadbed at all. The branch to Bahia Honda has a length of 2,340 meters, and it is found with all the grading and mechanical structures finished and the first coating spread but not solidified. At present this office is redacting the project for the termination of the first portion starting from Cabanas, which very soon will be submitted for approval. The approximate cost of these works will amount to \$27,000 United States currency.

#### GENERAL SURVEYS.

On the 1st of June of last year a technical commission, headed by Engineer Senor Peoli, for surveying roads was organized, commencing to discharge its duties on the road from Bahia Honda to Consolacion del Norte. This commission in surveying the road from Bahia Honda to Consolacion del Norte, 61 kilometers, including one transverse, has accomplished a labor of great merit considering the time in which the survey was made, considering also the very bad condition of the uninhabited land, covered in its greater portion with wild forests and thick shrubs, to be traveled only with the aid of the machete. An order to suspend this survey was wired by the secretary on the 3d of September, with the object of sending this commission to survey the highroad from this city to Guane, passing by San Juan y Martinez with a branch to Bailen, and reconnoissances from Luis Lazo to the Corojo, and from Luis Lazo to San Juan. This order was confirmed by letter from the director-general dated the 8th of same month. At the beginning of the month of September Senor Peoli was appointed chief engineer of the district of Matanzas, the engineer, Senor Smaller, taking charge of the commission. As this survey is not finished no judgment can be made in regard to it, moreover, the notes from the field books have not been transcribed as yet, though it can be said that the country crossed by the road is one of the richest in pine forests of the province, and that the road, if built, will give exit to a richness which to-day remains unexploited. The total expenses of this survey amount to \$3,071.94 United States currency, of which some items remain unpaid. The cost per kilometer amounted to \$50.36, a very low figure if the almost unsurmountable difficulties encountered by the lack of roads are kept in mind.

On the 18th of September the commission commenced the aforementioned survey from this city to Guane. This road will become the most important of the province. It goes through the richest zone where the most highly appreciated tobacco grows, and will communicate all this zone with the sea on one side and with this city, and thence with the capital of the island as well as all parts of the interior on the other. It will demand a considerable amount of money, as the plains are crossed by numberless rivers and creeks and the highlands are exceedingly cragged and cliffy, but this is a case in which the state must not pay attention to disbursements inasmuch as the benefit accrued to the country is unlimited. For these reasons this survey is carried on carefully, studying not only the present road, but also many variations which might reconcile economy in the laying out of the road with the facility of

communication with the most productive lands. This survey has been made up to Guane, a direct distance of 60 kilometers from this city, the total measurements amounting to 85 kilometers, including the several variations surveyed. The total amount of expenses of every kind reached the sum of \$2,097.13, the cost per kilometer being \$24.68 United States currency.

The same as in the survey of the road from Bahia Honda to Consolacion del Norte, nothing can be said a priori as to the cost of this road, as the notes from the field books are commenced to be plotted, and it may be possible that some important modification in the laying out of road studied will be considered advisable.

Besides the expenses incurred by the commission in the surveys mentioned several reconnaissances, which I will relate, were charged to this same credit. Some office personnel has also been charged to this credit, viz, the auxiliary engineer of this head office, the purchasing officer, and one inspector, which personnel became necessary owing to the great number of surveys and projects which were to be accomplished. The expenses originated by this personnel, including office implements and stationery, amounted to \$2,033.06 United States currency.

*Repairs, building, and reconstruction of bridges—Projects.*—It being necessary while the highways were being constructed to make the existing roads passable, building, rebuilding, and repairing the bridges thereof, a commission was appointed to execute the corresponding survey of bridges, some to be repaired and others to be constructed, with the object of proceeding immediately with the necessary works. This commission having been charged to the engineer, Mr. Guastella, he commenced to discharge his duties on the 17th of November, beginning with the field work. This work has not been finished as yet, so nothing can be said in regard to its utility, cost, etc. The bridges surveyed were the following: Bridges across rivers Ajiconal, Guaos, and Paso Viejo, on the road to Vinales; bridges across creeks Guanayabo, Magneyes, and river Cuyaguatete in the Mulo, and Cuyaguatete in Cabezas, on the road to Sumidero; Galafre, on the road to Mantua; Cuyaguatete, on the road to Guane; Guasimal, on the road from Guane to Mantua, and across creeks Hediondo and Sagua, on the road from Guane to Cortes. The cost of these surveys amounted to \$1,248.42 United States currency.

*Works executed on highways.*—The delegation of the district having been discontinued at Guanajay on the 31st of July, and the engineer, Senor Agramonte, having been transferred to the office of the chief engineer at Habana, the assistant, Senor Gonzales Castro, came to this city, being charged with the service. Besides the necessary work in keeping up the roads during the present half year, the repair on kilometers 33 to 38 of the highway from Habana to San Cristobal was continued; the mounting up of bridges across rivers Yaguasa and Rio Hondo were finished, and the project of repairs on several jobs and of kilometers 1 and 2 of the highway from Pinar del Rio to La Coloma have been studied. Attention has been given also to the dispatch and tramitation of numberless expedientes referring to fines, licenses, personnel, etc.

#### *Keeping up roads.*

##### Ditches and footpaths:

Digging of ditches.....	cubic meters..	998. 90
Grading of footpaths and clearing of ditches.....	square meters..	99, 314. 46
Stone gathered and quarried by administration.....	cubic meters..	2, 164. 00
Stone broken.....	.....	357. 00
Stone spread.....	square meters..	838. 00
Rolling.....	do.....	671. 70
Filling up holes and ruts.....	do.....	1, 580. 00
Stone gathered.....	cubic meters..	158. 00
Transportation of stone several distances.....	do.....	843. 00

##### Earth and sand:

Extraction of earth.....	cubic meters..	139. 00
Binding spread.....	square meters..	345. 00
Transportation of earth several distances.....	cubic meters..	1, 958. 10

##### Trees:

Trees fenced.....	.....	60. 00
Trees planted.....	.....	192. 00

The total expense on these works during the present half year was \$16,572.55. Besides these expenses there exists a contract with Mr. Herminio Fuentes for 200 cubic meters of broken stone from the quarry of Martin Mesa at a price of \$2.70 per cubic meter. This stone is to be used on kilometers 8 and 9 of the highway from Mariel to Cabanas. It will be delivered during the present month of January. Three hundred meters of unbroken stone from the quarry of San Mateo have also been contracted with Mr. Jose Rands at \$2.20 per cubic meter. This stone is to be used on the first 7 kilometers of the highway from Pinar del Rio to La Coloma. The delivery has not commenced as yet. This stone will be used in filling up holes and ruts by the personnel of maintenance. The number of kilometers kept in repair is 112.

*Repairs on kilometers 33 to 38.*

During the present half year the following works have been accomplished:

Digging of ditches.....	cubic meters..	222.05
Stone transported.....	do.....	429.97
Stone loaded.....	do.....	388.09
Stone spread.....	square meters..	19,634.00
Broken stone rolled.....	do.....	22,142.00
Binding spread.....	do.....	18,835.00
Binding transported.....	cubic meters..	127.38
Stones broken.....	do.....	110.00
Stones broken purchased.....	do.....	438.00
Grading of footpaths and clearing of ditches.....	square meters..	10,692.00
Binding rolled.....	do.....	16,565.00
Sand loaded.....	cubic meters..	184.63

The total cost of all these works during the half year amounted to \$5,606.69.

*Erection of bridges Yaguasa and Rio Hondo.*—At the ending of the first half year of 1900 the pieces of the bridges had only been transported to the openings and the scaffold for the mounting framed. The framing commenced in the month of July, finishing the one across Yaguasa River in August, and in September the one across Rio Hondo, remaining only to be given the second coating of paint on both, which was done in December last. The total cost during the present half year amounted to \$2,682.58 United States currency.

*Projects.*—On the 6th of October a project for repairing kilometers 1 and 2 of the highway from this city to La Coloma (the estimate thereof amounting to \$8,200 United States currency) was forwarded to the director-general, being approved on the 22d of October; but on the 22d of November the honorable military governor left, pending the approval of the necessary appropriation. Taking into consideration the bad condition of this highway, and especially its first 2 kilometers, the suspension of this credit has been a disappointment, inasmuch as it is feared that they may become impassable in the rainy season, inflicting great damages to the town, as these 2 kilometers form the communication with the railroad station. On the 28th of September a project for repairing the first culvert in kilometer 36 to 37 of the highway from Habana to San Cristobal was redacted. This project, of which the estimated cost amounts to \$380, is pending of approval. On the 23d of October a project for repairing the flooring and railing of the bridge across Bayate Creek, situated in the second section of the same highway (kilometer 79), was redacted. This project was approved on the 8th of December and the necessary appropriation, amounting to \$300, was granted by the governor-general. The necessary material has been contracted for and the work will begin very soon. Pursuant to orders received a study of a plan for building the necessary quarters for lodging the road keepers was commenced, having reported on the 6th of December that 17 of those were necessary in the several sections of this district, and I keep at hand several fore projects which will permit the rapid erection of them in case it be so ordered by the central office. At present a project is in study for substituting with a metallic one the wooden bridge Medina across Guama River, in kilometer 6 of the highway from Pinar del Rio to La Coloma, which is in very bad condition, having been burned during the late war. Besides all these works the personnel in charge of highways have rendered several reports in regard to the actual state of same, which will serve as base for the projects of the repairs considered as pressing. The highway repair force is: One assistant in charge, 4 inspectors, 8 foremen, 40 road keepers, 5 cartmen, 1 typewriter, 1 warehouse keeper, and 1 cartman for the warehouse, the cost of all which is included in the general cost of maintenance.

*Studies, projects, and several reconnaissances.*—On the 29th of October a project of a bridge across river San Sebastian at the fort called "Cascara de Coco" on the road from San Luis to Punta de Cartas was submitted to the director-general. The bridge was projected with two wooden sections resting on concrete abutments and a wooden palisade with a concrete foundation. The estimated cost amounts to \$3,441.84 United States currency. This bridge is of great importance, as the swellings of the river San Sebastian are exceedingly violent, cutting off for many days the port of Punta de Cartas, the best for the exportation of the rich vegas of San Luis. Therefore it would be convenient to have this bridge built before the next rainy season, coincident with the harvesting of the tobacco crop. This project was not approved up to the ending of the year.

*Bridge across Galeano Creek on the road from Pinar del Rio to San Juan y Martinez.*—This bridge is included among those which were to be repaired in accordance with order 231, series 1899. It remained unrepaired, with those across rivers Guama and Trancas, and as I have referred above to the latter I will now refer to the former. Being located almost within the limits of the town the swellings of creek Galeano

cuts off the city from the vegas and makes rather difficult the important traffic of the road to San Juan y Martinez. For all these reasons this head office considered indispensable the building of a permanent bridge. A great deal of figuring was done (the same as in Trancas) to accommodate the building of a bridge in these conditions at the low figure estimated. In view of the impossibility of the task a new project was redacted in which the bridge was to be built of bricks and concrete, on the present road, with the object of avoiding the forcible expropriation which would result from the violent opposition from the owner of one of the adjoining vegas where a better opening exists. This project, amounting to \$4,959, was submitted to the head department on the 4th of October, which decided on the 19th that in consideration of the excessive cost which the construction of this bridge would originate at the moment of building the highway to Guane, as it required large embankments, a survey should be made across the vega mentioned. In compliance with this order, on the 30th of October a project of a steel bridge with concrete abutments was forwarded. In this project were included 400 meters of the highway from the town up to said vega. The estimate amounts to \$6,722.24 United States currency. Said project was approved on the 19th of November, and the drafting of the necessary documents for the public auction was directed, as well as an agreement with the owner of the vega to acquire the necessary land without having to recur to a forcible expropriation. The matter is pending approval, and it would be desirable to decide it as soon as possible, as this bridge should be built before the rainy season.

*Bridge across Rio Feo, road to the Ingenio, municipality of San Luis.*—On the 31st of October a project for repairing the flooring and railing of this bridge was forwarded, being approved on the 21st of November, and on the 4th of December an appropriation amounting to \$512.44 was granted. The plan of the works once approved, the contract was made for the necessary lumber, and as soon as the repairs on Marcos Vazquez bridge are finished the gang of carpenters will undertake the job. The contractor is Mr. Jose Bone and the lumber contracted is Cuban yellow pine at \$50 per 1,000 feet at the place of work.

*Bridge across river San Cristobal, kilometer 91, on the highway from Habana to San Cristobal.*—At the beginning of December, in compliance with orders received from the director-general, the necessary data was taken for mapping the crossing of said highway over San Cristobal River, as well as for obtaining the plan of the abutments which are already built, with the idea of constructing a metallic bridge. With the construction of this bridge the distance from Habana to San Cristobal can be freely traveled. At present this head office is redacting the corresponding project, which will embrace some modifications in the grades of the highway and the construction of one small bridge. It can be said a priori that the cost of all these works will not exceed \$30,000 United States currency.

#### RECONNOISSANCES.

The undersigned has made reconnoissances of different rivers and bridges destroyed, viz, the ford of river Mosquito on the road from Mariel to Banes, in the municipality of Mariel, and the wreck of the bridge across river Capellanias, on the road from Artemisa to Seiba del Agua, municipality of Artemisa. This bridge will be studied by the commission in charge of bridges of this province. A reconnoissance has also been made of the portion of highway from Caimito to Guayabal, which starts from the highway from Habana to San Cristobal at the place first named. Nothing can be said of that portion at present, as the report which is to be forwarded has not been finished yet. Pursuant to orders from the secretary's office the portion of the highway from the destroyed town of Puerta de la Guira to kilometer 53 of the highway from Habana to San Cristobal was also reconnoitered, the director-general having been informed on the 12th of December of its very bad condition for travel, and that in consideration of the large sum that the repairing of same would amount to, it would be convenient to postpone the matter until the department is in better pecuniary conditions.

#### RECONNOISSANCES OF ROADS.

When referring to the survey of the highway from Pinar del Rio to Guane I said that several reconnoissances had been made to adopt the direction which would best accommodate economy with the commercial interest of the province, and I can now say that I have reconnoitered all the roads which, starting from Pinar del Rio, lead to Guane and Mantua. They are as follows: Road from Pinar del Rio to San Juan y Martinez, by royal road, by the road from Pinar del Rio to San Luis, with deviation by Zamacois. Road from San Luis to San Juan by Tarabico ford; from Pinar del Rio to Rio Feo, by the road to Rio Sequito; from San Juan to Guane; by La Comuna,

Galafre, Naranjo, El Sabalo y Hacienda del Valle; by Jibaro, Aserradera, Loma de Contadores, Cayo Claro, Teneria, and Portales; by El Sabalo, Machuca, Cueva Obscura, and Portales; by El Sabalo, Obra de Naranjo, Ulloa, La Guasasa, and Portales; by La Vigia, El Pinon, Cayo Bonito, Tibisi, Jutia, Cruz del Cerro, Ulloa, La Guasasa and Portales; by Palma Sola, La Maquina, Berraco, Luis Lazo, San Carlos, Los Acostas, Punta la Sierra, Teneria, and Portales; by Luis Lazo, Sabanas Llanas, La Macagua, Punta la Sierra, Teneria, and Portales. From these reconnoissances I have concluded that the best direction for the highway will be by San Juan, El Sabalo, Teneria, Portales, and Guane. With the same object I have reconnoitered the road from Guane to Mantua by Juan Torres, Hato Guane, and Montezuelo. I have also gone over the road from Pinar del Rio to Guane by El Cerro, Cabezas, El Mulo, Sumidero, Arenales, and Luis Lazo. In compliance with an order by telegraph from the secretary's office, dated the 6th of September, I also reconnoitered the road from Pinar del Rio to Vinales by San Jose and Ceja del Negro; and from Vinales to the beach of La Esperanza by San Vicente and Fuerte Melguizo. The road from Consolacion del Sur to Rio Blanco by El Tejar and La Vuelta has been reconnoitered also. From all these reconnoissances and other inspections which I have made in this province I have concluded that the most necessary highways for this district are: The prolongation to this city of the Habana to San Cristobal highway, that from Pinar del Rio to Mantua, and that from this capital (Pinar del Rio) to Vinales and La Esperanza. As to others it would be more convenient to repair the existing roads and build the bridges which they yet lack.

I believe it my duty not to end this report without stating the willingness displayed by all the personnel, when complying with the orders dictated by this head office, often putting in action proper initiatives of great benefits.

Yours, respectfully,

ESTEBAN DUQUE ESTRADA,  
*Chief Engineer.*





# REPORT OF THE CHIEF ENGINEER OF THE DISTRICT OF HABANA.

## FIRST SECTION OF HIGHWAY FROM HABANA TO SAN CRISTOBAL.

Work.	Unity.	Work executed.	Cost.	Cost per unity.
<i>Maintenance of highways.</i>				
Opening of side drains.....	M <sup>3</sup> .....	305.28	\$208.95	\$0.680
Resurfacing walks and cleaning out drains.....	M <sup>2</sup> .....	117,582.80	1,945.31	.016
Carting of rock.....	M <sup>3</sup> .....	96.50	98.56	1.020
Carting of earth.....	M <sup>3</sup> .....	287.50	128.66	.450
Breaking of rock.....	M <sup>3</sup> .....	209.50	212.57	1.010
Patching.....	M <sup>2</sup> .....	585	100.86	.170
Rock.....	M <sup>3</sup> .....	778	1,722.14	2.213
Gathering of rock.....	M <sup>3</sup> .....	30	14.23	.410
General charges.....			82.84	
Total.....			4,514.12	
<i>Repairing of kilometers 3 to 5.</i>				
Spreading of macadam.....	M <sup>2</sup> .....	13,581	534.91	.040
Rolling.....	M <sup>2</sup> .....	14,781	726.75	.049
Spreading of binding material.....	M <sup>2</sup> .....	11,540	39.41	.003
Sprinkling.....	M <sup>3</sup> .....	524	120.98	.231
Transportation.....	M <sup>3</sup> .....	41	22.46	.548
Foundation stone.....	M <sup>3</sup> .....	151	31.10	.205
Macadam.....	M <sup>3</sup> .....	3,448	6,365.85	1.846
Transportation of rock.....	M <sup>3</sup> .....	368	132.70	.361
General charges.....			152.84	
Total.....			8,127.00	
<i>Repairing of kilometers 8 to 11.</i>				
Excavation hard earth.....	M <sup>3</sup> .....	18	37.05	2.059
Spreading of macadam.....	M <sup>2</sup> .....	12,669	363.54	.029
Rolling.....	M <sup>2</sup> .....	12,669	645.17	.051
Spreading of binding material.....	M <sup>2</sup> .....	9,723	30.64	.003
Broken stone.....	M <sup>3</sup> .....	3,097.59	7,232.43	2.335
Sprinkling.....	M <sup>3</sup> .....	258	147.13	.578
Carting of binding material.....	M <sup>3</sup> .....	219	105.73	.483
Carting of macadam.....	M <sup>3</sup> .....	34	10.63	.317
Carting of telford.....	M <sup>3</sup> .....	9	5.22	.614
Staking out of openings for side drains.....	M. L.....	400	1.10	.003
Opening of side drains.....	M <sup>3</sup> .....	796	406.90	.511
Carting of earth.....	M <sup>3</sup> .....	656	234.18	.359
Laying of pipes.....	M. L.....	11	4.10	.373
Repairs to railings.....	M. L.....	31	154.62	4.987
Resurfacing of walks.....	M <sup>2</sup> .....	2,125	26.70	.012
Salary of administrative personnel.....			294.97	
General expenses.....			234.48	
Total.....			9,934.59	

## FIRST SECTION OF THE HIGHWAY FROM HABANA TO GUINES.

<i>Maintenance.</i>				
Resurfacing of walks and cleaning out of side drains.....	M <sup>2</sup> .....	69,163	\$1,719.16	\$0.024
Carting of rock.....	M <sup>3</sup> .....	67	21.26	.317
Patching.....	M <sup>2</sup> .....	3,419.24	106.89	.031
Rock.....	M <sup>3</sup> .....	200	500.00	2.500
Pruning of trees.....	One.....	128	25.53	.199
Rolling.....	M <sup>2</sup> .....	2,755	68.52	.024
General charge.....			82.89	
Total.....			2,524.25	

## FIRST SECTION OF THE HIGHWAY FROM HABANA TO GUINES—Continued.

Work.	Unity.	Work executed.	Cost.	Cost per unity.
HIGHWAY FROM LUYANO TO LA GALLEGA.				
<i>Maintenance.</i>				
Opening of side drains.....	M <sup>3</sup> .....	348.45	\$159.47	\$.460
Resurfacing walks and cleaning side drains.....	M <sup>2</sup> .....	37,074	930.18	.025
Carting of rock.....	M <sup>3</sup> .....	140.65	51.06	.363
Carting of earth.....	M <sup>3</sup> .....	671.75	328.01	.488
Crushing of rock.....	M <sup>3</sup> .....	88.75	100.65	1.130
Patching.....	M <sup>2</sup> .....	3,423	254.09	.073
Painting.....	M <sup>2</sup> .....	47	25.84	.549
Rolling.....	M <sup>2</sup> .....	3,092	186.12	.060
General charges.....			82.89	
Total.....			2,118.31	
<i>Filling of kilometers 11 to 15.</i>				
Telford.....	M <sup>3</sup> .....	280	504.00	1.800
Macadam.....	M <sup>3</sup> .....	212	496.00	2.340
Total.....			1,000.00	

## SECOND SECTION OF THE HIGHWAY FROM HABANA TO GUINES.

<i>Maintenance.</i>				
Opening of side drains.....	M <sup>3</sup> .....	908.69	\$417.61	\$0.462
Resurfacing walks and cleaning side drains.....	M <sup>2</sup> .....	80,888	2,134.38	.026
Carting of earth.....	M <sup>3</sup> .....	639.10	345.45	.540
Breaking of rock.....	M <sup>3</sup> .....	41.75	44.50	1.065
Patching.....	M <sup>2</sup> .....	142.76	48.23	.330
Rock.....	M <sup>3</sup> .....	503	1,006.00	2.000
Pruning of trees.....	One.....	800	73.83	.092
Sprinkling of patches.....	M <sup>2</sup> .....	219	38.00	.173
Quarrying.....	M <sup>3</sup> .....	40	16.69	.417
Rolling of rock in patches.....	M <sup>2</sup> .....	3,550	216.99	.054
Laying of rock.....	M <sup>2</sup> .....	3,550	140.30	.395
General charge.....			165.78	
Total.....			4,647.76	
<i>Repairing of kilometers 20 and 21.</i>				
Laying of macadam.....	M <sup>2</sup> .....	4,100	107.10	.026
Crushing.....	M <sup>2</sup> .....	4,100	194.70	.047
Spreading of binding material.....	M <sup>2</sup> .....	4,100	28.20	.007
Sprinkling.....	M <sup>3</sup> .....	77	29.88	.388
Carting of binding material.....	M <sup>3</sup> .....	100	29.88	.298
Broken stone.....	M <sup>3</sup> .....	40	80.00	2.000
Opening of side drains.....	M <sup>3</sup> .....	493	337.40	.690
Carting of rock.....	M <sup>3</sup> .....	86	20.70	.240
Salary of administrative personnel.....			551.07	
Mules.....			270.00	
General expenses.....			235.52	
Total.....			1,884.45	
<i>Repairing of kilometers 25 to 27.</i>				
Broken stone.....	M <sup>3</sup> .....	1,015	1,816.85	1.790
Laying of macadam.....	M <sup>2</sup> .....	6,988	337.53	.048
Rolling.....	M <sup>2</sup> .....	7,988	404.47	.050
Spreading of binding material.....	M <sup>2</sup> .....	7,988	72.79	.010
Sprinkling.....	M <sup>3</sup> .....	139	92.15	.662
Carting of binding material.....	M <sup>3</sup> .....	83	16.80	.202
Carting of rock.....	M <sup>3</sup> .....	207	47.50	.229
Hauling of wood.....	M <sup>3</sup> .....	3	.99	.330
Opening of side drains.....	M <sup>3</sup> .....	488	181.20	.371
Carting of rock.....	M <sup>3</sup> .....	91	18.30	.201
Salaries professional personnel.....			284.43	
General expenses.....			160.54	
Total.....			3,433.55	
HIGHWAY FROM HABANA TO BEJUCAL.				
<i>Maintenance.</i>				
Opening of side drains.....	M <sup>3</sup> .....	3,221.72	1,081.67	.320
Resurfacing walks and cleaning side drains.....	M <sup>2</sup> .....	96,406.25	1,402.48	.014
Carting of rock.....	M <sup>3</sup> .....	94	122.75	1.300
Carting of earth.....	M <sup>3</sup> .....	2,421	571.72	.230

## SECOND SECTION OF THE HIGHWAY FROM HABANA TO GUINES—Continued.

Work.	Unity.	Work executed.	Cost.	Cost per unity.
HIGHWAY FROM HABANA TO BEJUCAL—continued.				
<i>Maintenance—Continued.</i>				
Patching .....	M <sup>2</sup> .....	835 .....	\$144.47 .....	\$0.170 .....
Rock .....	M <sup>3</sup> .....	200 .....	403.50 .....	2.010 .....
Pruning of trees .....	One .....	166 .....	29.89 .....	.180 .....
Sprinkling of holes .....	M <sup>3</sup> .....	24 .....	20.82 .....	.870 .....
General charges .....			6.75 .....	
Total .....			3,784.05 .....	
HIGHWAY FROM ARROYO APOLO TO MANAGUA.				
<i>Maintenance of highways.</i>				
Opening of side drains .....	M <sup>3</sup> .....	275.86 .....	197.33 .....	.710 .....
Resurfacing walks and cleaning side drains .....	M <sup>2</sup> .....	80,652.29 .....	1,201.55 .....	.014 .....
Carting of rock .....	M <sup>3</sup> .....	116.05 .....	66.65 .....	.570 .....
Carting of earth .....	M <sup>3</sup> .....	813.65 .....	296.87 .....	.370 .....
Patching .....	M <sup>2</sup> .....	559 .....	38.00 .....	.060 .....
Sprinkling of patches .....	M <sup>3</sup> .....	50 .....	28.63 .....	.570 .....
Rolling of rock in holes .....	M <sup>2</sup> .....	404 .....	56.62 .....	.140 .....
General charges .....			17.76 .....	
Total .....			2,103.41 .....	
<i>Repairing of kilometers 12 to 20.</i>				
Laying of macadam .....	M <sup>2</sup> .....	23,814 .....	793.64 .....	.033 .....
Rolling .....	M <sup>2</sup> .....	22,224 .....	851.98 .....	.039 .....
Spreading of binding material .....	M <sup>2</sup> .....	15,592 .....	72.86 .....	.003 .....
Broken stone .....	M <sup>3</sup> .....	4,290.27 .....	9,299.88 .....	2.167 .....
Sprinkling .....	M <sup>3</sup> .....	678 .....	197.10 .....	.291 .....
Cleaning .....	M <sup>2</sup> .....	1,991 .....	12.60 .....	.006 .....
Carting of binding material .....	M <sup>3</sup> .....	207 .....	382.54 .....	1.751 .....
Extraction of earth .....	M <sup>3</sup> .....	182 .....	36.50 .....	.200 .....
Opening of side drains .....	M <sup>3</sup> .....	1,222 .....	267.03 .....	.219 .....
Loading, transportation, and unloading of rock .....	M <sup>3</sup> .....	69 .....	34.16 .....	.495 .....
Resurfacing embankment .....	M <sup>2</sup> .....	182 .....	8.10 .....	.045 .....
Resurfacing walks .....	M <sup>2</sup> .....	16,128 .....	161.07 .....	.010 .....
Carting of earth .....	M <sup>3</sup> .....	419 .....	66.24 .....	.158 .....
Culvert No. 7:				
Excavating and carting earth .....	M <sup>3</sup> .....	103.60 .....	155.40 .....	1.500 .....
Common masonry .....	M <sup>3</sup> .....	28.82 .....	204.60 .....	7.100 .....
Hydraulic masonry .....	M <sup>3</sup> .....	50.96 .....	382.20 .....	7.500 .....
Brickwork .....	M <sup>3</sup> .....	17.66 .....	222.53 .....	12.600 .....
Expanded metal .....	Ks. .....	536.40 .....	62.20 .....	.0975 .....
Rail flooring .....	Ks. .....	6,588.10 .....	230.54 .....	.035 .....
Protection to foundations .....	M <sup>3</sup> .....	11.54 .....	81.94 .....	7.100 .....
General charges .....			67.22 .....	
Coal .....			69.50 .....	
Lumber .....			13.05 .....	
Advertising .....			5.40 .....	
Salaries of administrative personnel .....			474.99 .....	
Forage .....			322.51 .....	
Total .....			14,445.78 .....	
HIGHWAY FROM PUNTA BRAVA TO CANGREJERAS.				
<i>Repairing.</i>				
Excavating in earth .....	M <sup>3</sup> .....	2,203 .....	1,096.84 .....	.497 .....
Quarrying .....	M <sup>3</sup> .....	198 .....	196.19 .....	.990 .....
Excavating for drains .....	M <sup>3</sup> .....	46 .....	21.30 .....	.463 .....
Placing of drains .....	M. L. .....	16 .....	59.21 .....	3.700 .....
Embankment .....	M <sup>3</sup> .....	344 .....	145.61 .....	.430 .....
Macadam (crushing) .....	M <sup>2</sup> .....	839 .....	646.91 .....	.771 .....
Laying of telford .....	M <sup>2</sup> .....	41.75 .....	143.42 .....	.034 .....
Laying of macadam .....	M <sup>3</sup> .....	12,775 .....	597.43 .....	.047 .....
Opening of side drains .....	M <sup>3</sup> .....	1,465 .....	397.04 .....	.271 .....
Transportation of wheelbarrows .....	M <sup>3</sup> .....	569 .....	235.72 .....	.414 .....
Cutting away of fences .....	M. L. .....	4,700 .....	286.65 .....	.061 .....
Binding material .....	M <sup>3</sup> .....	212 .....	465.64 .....	2.196 .....
Rolling .....	M <sup>2</sup> .....	10,800 .....	455.84 .....	.042 .....
Foundations, stone .....	M <sup>3</sup> .....	300 .....	53.84 .....	.179 .....
Spreading and rolling binding material .....	M <sup>2</sup> .....	10,800 .....	223.65 .....	.021 .....
Finishing of embankment .....	M <sup>2</sup> .....	150 .....	7.08 .....	.047 .....
Rolling of roadbed .....	M <sup>2</sup> .....	6,600 .....	235.60 .....	.035 .....
Arranging of side stones and telford .....	M <sup>3</sup> .....	10,500 .....	297.29 .....	.028 .....
Transportation of earth in wagons .....	M <sup>2</sup> .....	420 .....	110.80 .....	.264 .....
Culvert of kilometer 3 .....			101.42 .....	

## SECOND SECTION OF THE HIGHWAY FROM HABANA TO GUINES—Continued.

Work.	Unity.	Work executed.	Cost.	Cost per unity.
HIGHWAY FROM PUNTA BRAVA TO CANGREJERAS—con'd.				
<i>Repairing—Continued.</i>				
Repairing and travels of steam road cylinder .....			\$163.96	
General repairs .....			14.80	
Transportation of supplies .....			25.79	
Reimbursement of expenses .....			32.09	
Rent of house .....			84.00	
Total .....			6,098.12	
HIGHWAY FROM BATABANO TO SURGIDERO.				
<i>Repairing.</i>				
Clearing and cleaning out of side drains .....	M. L.	6,160		
Clearing of highway .....	M. L.	1,560		
Grading .....	M. L.	1,560		
Spreading of rock and metaling .....	M. L.	1,560		
Rolling and spreading of binding material .....	M. L.	1,440		
Paid for 1,400 linear meters of highway, complete .....			4,704.00	\$3.36
Salary of assistant .....			300.00	
Advertising and printing forms .....			16.74	
Total .....			5,020.74	
<i>General surveys.</i>				
First section:				
Field work .....				
Alquizar branch .....	K <sup>e</sup> ..	11.160	286.98	25.71
Second preliminary from Managua to San Antonio de las Vegas .....	K <sup>e</sup> ..	21.029	770.23	36.62
From Managua to Santa Anselma .....	K <sup>e</sup> ..	6.686	180.40	26.98
Guanabacoa to Cojimar .....	K <sup>e</sup> ..	4	77.48	19.37
Office work .....				
Managua to Batavano, first and second preliminary .....			1,364.96	
Guanabacoa to Cojimar .....				
San Antonio de los Baños to Rincon, preliminary .....				
Second section:				
Field work on the highways from Nueva Gerona to Santa Fe, and from this point to Jucaro .....	K <sup>e</sup> ..	21.177	460.72	16.95
Office work .....				
On the highways from Nueva Gerona to Santa Fe, and from this point to Jucaro .....			936.77	
Reimbursement of expenses .....			223.32	
Photographs and photographic supplies .....			118.33	
Office supplies .....			79.93	
Total .....			4,499.12	

## RECAPITULATION.

First section of the highway from Habana to San Cristobal:		Highway from Arroyo Apolo to Managua:	
Maintenance .....	\$4,514.12	Maintenance .....	\$2,103.41
Repairing kilometers 3 to 5 .....	8,127.00	Repairing of kilometers 12 to 20 .....	14,445.78
Repairing kilometers 8 to 11 .....	9,934.59	Salaries of the administrative personnel, charged to maintenance of highways .....	1,668.30
First section of the highway from Habana to Guines:		Highway from Punta Brava to Cangrejas:	
Maintenance .....	2,524.25	Repairing .....	6,098.12
Highway from Luyano to La Gallega:		Highway from Batavano to Surgidero:	
Maintenance .....	2,118.31	Repairing .....	5,020.74
Filling of kilometers 11 to 15 .....	1,000.00	General surveys .....	4,499.12
Second section of the highway from Habana to Guines:		Permanent personnel .....	2,689.98
Maintenance .....	4,647.76	Office supplies .....	130.26
Repairing of kilometers 20 and 21 .....	1,884.45		
Repairing of kilometers 25 to 27 .....	3,433.55	Total .....	78,623.79
Highway from Habana to Bejucal:			
Maintenance .....	3,784.05		

## RAILROADS.

- June 10, 1900. Acceptance by the department of new buildings of the Western Railway used as station house and warehouse at Taco-Taco.
- Aug. 30, 1900. Report on the petition of the ayuntamiento of San Felipe, requesting that San Vicente street be opened to public traffic, obstructed by the Habana Railway.
- Sept. 12, 1900. Acceptance by the department of warehouse for storing merchandise at the Cristina station, Western Railway.

- Aug. 3, 1900. Report on the metal bridges of Paula and Pedernales of the Western Railway.  
 Sept. 13, 1900. Statements of accidents which occurred during months of July and August on the United Railways of Habana.  
 Sept. 18, 1900. Report on the proceedings filed relative to the controversy between the city council and the Villanueva Railroad in regard to arrangement of trains in the yard of the company.  
 Oct. 18, 1900. Report on the petition of the town council of Guanabacoa, asking that gates be placed at the crossing of the Tricornia Railroad with the Cojimar Railroad.  
 Nov. 12, 1900. Acceptance by the department of the iron bridge over the Pedernales River at kilometer 19 of the Western Railway.  
 Nov. 18, 1900. Acceptance by the department of the station house Ovas and warehouse to be used for storing merchandise at kilometer 166 of the Western Railway.  
 Nov. 18, 1900. Remitted for approbation of the secretary, report and plans of San Juan and Bayate bridges of the Western Railway.  
 Nov. 26, 1900. Report relative to a switch which the Western Railway Company desires to construct at Alquizar station.  
 Nov. 28, 1900. Report on plans for yard and buildings which the Western Railway Company desires to construct at the Herradura station, as also on those for enlarging and improving station at Candelaria.  
 Dec. 26, 1900. Acceptance by the department of bridges over the San Juan and Bayate rivers from the Western Railway.  
 Dec. 29, 1900. Report on enlarging and improving certain works which the Western Railway desires to construct at Punta Brava.

## PREPARATION OF PROJECTS.

- July 9, 1900. Batabano to Surgidero.  
 Sept. 23, 1900. Guanabacoa to Cojimar.  
 Oct. 13, 1900. Cuatro Caminos to La Canoa.  
 Oct. 26, 1900. Building 12 stalls and yard for cattle at the Cerro house of the department.  
 Nov. 23, 1900. Preliminary project for pumping station in the town of San Nicolas.  
 Nov. 24, 1900. Estimate of additional amount required to finish repairing kilometers 3 to 5 of San Cristobal.  
 Dec. 15, 1900. Preliminary project for a steel bridge at Vento, over the Almendares River.  
 Dec. 24, 1900. Steel bridge over the Almendares River to substitute that known as "Cauongo," on the highway from Habana to San Cristobal.  
 Dec. 26, 1900. Specifications for furnishing and putting up the pumping station at San Nicolas.  
 Nov. 14, 1900. Luyano to La Gallega, kilometers 15 to 5, excluding No. 10.

## EXAMINATIONS MADE AND REPORTS OF BRIDGES, HIGHWAYS, ETC.

- Sept. 24, 1900. Canongo bridge on highway from Habana to San Cristobal.  
 Sept. 24, 1900. Pump and well at San Nicolas.  
 Oct. 22, 1900. Road to Alquizar.  
 Oct. 22, 1900. Stone on road from San Antonio de los Banos to Rincon.  
 Nov. 8, 1900. Interception of the San Pedro road with the highway from Cano to Wajay.

## CONTRACTS.

Date.	Awarded.	Object.
1900.		
July 3	Sussdorff, Zaldo & Co. ....	Culvert No. 7 at kilometer 12 of the highway from Arroyo Apolo to Managua; finished Oct 16, 1900.
31	Ramon Gonzalez. ....	Stone at kilometers 14 and 15, San Cristobal highway.
31	Jose Garcia. ....	Stone at kilometers 23 and 24, highway Habana to Guines.
Aug. 3	Rafael A. Martinez. ....	Repairing kilometers 3 to 5, highway Habana to San Cristobal.
20	Ramon Gonzalez. ....	Stone at kilometer 21, highway to San Cristobal.
31	Juan Paleo. ....	Stone at kilometers 3 to 6, highway to Bejucal.
31	Simon Diaz. ....	Do.
31	Jose Lago. ....	Patching kilometers 11 to 15, highway from Luyano to La Gallega.
Sept. 20	Sussdorff, Zaldo & Co. ....	Repairing highway from Batabano to Surgidero.
20	Miguel Gonzalez. ....	Stone at kilometers 16 to 21, San Cristobal highway.
Oct. 20	Jose Lago. ....	Stone at kilometers 3 to 5, Guines highway.
31	do. ....	Stone highway from Guanabacoa to Cojimar.
Dec. 3	Manuel Paredes. ....	Stone at kilometers 6 and 7, highway from Habana to San Cristobal.
3	do. ....	Stone at kilometers 13, 14, 12, 16, 22, and 23 of the highway from Habana to San Cristobal.
3	do. ....	Stone at kilometers 11, 12, 13, 14, and 15 of the Guines highway.
3	M. A. Glinn. ....	Stone at kilometers 6 to 10, highway from Habana to Guines.
	FORAGE.	
Oct. 8	Guillermo Martinez. ....	(30,000 pounds oats, at \$1.80 per quintal. 30,000 pounds hay, at \$1.36 per quintal. 30,000 pounds corn, at \$1.50 per quintal.

## REPORT OF BUILDING LICENSES.

Date.	Name.	Locality.	Highway.
1900.			
July 5	Sr. Juan Hernandez .....	Hoyo Colorado .....	First section, Habana to San Cristobal.
5	Sr. Victor Biscarf .....	Santa Maria del Rosario .....	Branch, Habana to Guines.
5	Sr. Leon Undaveita .....	.....do .....	Do.
13	Sra. Josefa Zamora .....	Marianao, Real No. 2. ....	First section, Habana to San Cristobal.
16	Sr. Gerardo Rigau .....	Managua, Real 48 .....	Arroyo Apolo to Managua.
19	Sr. Tomas Juara .....	Marianao, Real 164 .....	First section, from Habana to San Cristobal.
30	Sr. Enrique Riquelme .....	Punta Brava .....	Habana to San Cristobal.
Aug. 3	Sr. Ramon Diaz .....	Corral-Falso, Guanabacoa ..	Luyano to La Gallega.
3	Sr. Martinez .....	Jamaica .....	Habana to Guines.
21	Sr. Jose Lemus Valdes .....	Marianao, Real 77 .....	Habana to San Cristobal.
21	Corporacion Municipal de Marianao.	Marianao, Real 142 .....	Do.
20	Sr. Gregorio Rodriguez .....	Guines, Real 32 .....	Habana to Guines.
28	Sr. Manuel Gastetumendio ..	Santa Maria del Rosario ..	Branch, from Habana to Guines.
Sept. 12	Sr. Tomas Carrera .....	San Cristobal .....	Habana to San Cristobal.
25	Sr. Carlos Pena .....	Hoyo Colorado, Real .....	Do.
25	Sr. Mariano Ravelo .....	Jamaica .....	Habana to Guines.
25	Sr. Tomas Cruz .....	Hoyo Colorado .....	Habana to San Cristobal.
Oct. 11	Sr. Tomas Juara .....	Marianao, Real 162 .....	Do.
15	Sr. Jose Copino .....	Cuatro Caminos .....	Habana to Guines.
18	Sr. Juan Romero .....	Independencia 43, Managua ..	Arroyo Apolo to Managua.
Nov. 19	Sr. Juan Acosta .....	Luyano 88 .....	Habana to Guines.
23	Sr. Candido Vega .....	Rincon, Real 5 .....	Habana to Bejucal.
Dec. 10	Sr. Enrique Perez .....	Calvario .....	Habana to Managua.

## MISCELLANEOUS.

- Aug. 18, 1900. Acceptance by the department of the branch of highway from Guanabacoa to Cojimar.
- Aug. 20, 1900. Report on the manner in which Mr. Oscar Giquel can construct on his estate, Cacalote, at kilometer 15, highway from Habana to San Cristobal, small bridge.
- Aug. 20, 1900. Lengthening of railing at house Real 135, Marianao, on the highway Habana to San Cristobal.
- Aug. 21, 1900. Acceptance by the department of the road from Wajay to Cano, and from Cano to the highway from Habana to San Cristobal.
- Aug. 30, 1900. Report relative to the transfer to the department of the pumping station at Santiago de las Vegas.
- Sept., 1900. Surveying roads and bridges in the Isle of Pines.
- Sept. 21, 1900. Report of conditions on which permission can be granted to establish a telephone line between Habana and Santa Maria del Rosario.
- Sept. 26, 1900. Estimate of \$92, cost of constructing a drain, which, crossing the highway from Habana to San Cristobal at the entrance to Quemados de Marianao, will afford an outlet to stagnant waters.
- Oct. 2, 1900. Permission granted to the mayor of Bauta to construct and reconstruct the small bridges of the towns of Punta Brava and Hoyo Colorado on certain streets.
- Oct. 5, 1900. Report in regard to the lands of the San Lazaro Hospital.
- Oct. 24, 1900. Report in regard to the change in the dimension of the highway at present being constructed from said point to Surgidero, in accordance with request made by the town council of Batabano.
- Nov. 22, 1900. Report relative to the parcel of land occupied by the road house of the department of Arroyo Apolo, and which is claimed by Mr. Jose Edesa.
- Dec. 18, 1900. In view of endeavors to rent a portion of the cattle farm Dique, plans of the same were forwarded.
- Dec. 19, 1900. Sale of a small portion of useless articles deposited in the general warehouse of the department.
- Dec. 23, 1900. Report and plans of the lands occupied by the road house "Cruz de Piedra," on the highway from Luyano to La Gallega.

*Statement of fines imposed for infractions of the highway ordinances in force, collected on dates given and the total amount of which was paid into the treasury of the island of Cuba.*

Dates.	Infractions.	Highways.	Arti- cles.	Fines.*	Town council who made collection.
1900.					
July 23	Beatriz Hernandez .....	Luyano to La Gallega .....	20	\$1.00	Guanabacoa.
26	Rafael Collado .....	do .....	20	4.00	Do.
29	Felipe Ortega .....	First of San Cristobal .....	21	1.00	Bauta.
Aug. 6	Miguel Santos .....	Luyano to La Gallega .....	30	4.00	Guanabacoa.
13	Pedro Llerena .....	do .....	20	1.30	Do.
17	Antonio Ramos .....	First of San Cristobal .....	21	2.00	Bauta.
18	Eulogio Don .....	Second of Habana to Guines .....	23	5.00	San Jose de las Lajas.
20	Jose Hernandez .....	First of San Cristobal .....	28	6.00	Bauta.
Sept. 20	Francisco Garcia .....	Habana to Bejucal .....	10	8.00	Do.
21	Antonio Garcia .....	Second of Habana to Guines .....	20	1.00	San Jose de las Lajas.
Oct. 31	Jose Gonzalez .....	First of Habana to Guines .....	13	7.25	Do.
Nov. 2	Jose Corteguera .....	Second of Habana to Guines .....	21	2.00	Do.
13	Juan Negrin .....	Habana to Bejucal .....	13	6.00	Bejucal.
19	Rafael Perez .....	First of Habana to Guines .....	28	2.50	Tapaste.
30	Antonio Garcia .....	Second of Habana to Guines .....	21	1.00	San Jose de las Lajas.
	Total .....	.....		52.05	

\* United States currency.

*Statement showing total amount collected from the sale of old iron and other useless articles, stored in the warehouse of the department, said amount paid into the treasury of the island of Cuba.*

Date.	Buyer.	Articles sold.	Value.
1900.			
Oct. 27	Eduardo Corrasco .....	Old iron .....	\$3.83
27	Alfredo Veranes .....	A forge, bullock's yoke, and belt .....	19.00
19	Jose Diaz .....	do .....	17.00
27	Juan Roses .....	do .....	17.00
	Total .....	.....	56.83

*Report submitted relative to the works accomplished during the second half of the year 1900.*

MATANZAS, January 20, 1901.

SIR: Complying with the directions contained in your communication of the 13th of December last, I submit the following report of the works accomplished by this head office during the first half of the fiscal year 1900-1901.

As the undersigned took possession of his office in the last days of November, almost at the ending of the period comprised, this report will be found, necessarily, lacking details.

Attention has been given in first place to the following works: (I) Highway from Matanzas to Canasi; (II) dredging of Buba Channel, bay of Cardenas; (III) highway from Matanzas to Cidra and Santa Ana; (IV) San Luis Bridge, Matanzas; (V) inundations of Roque and Recreo; (VI) market of Matanzas; (VII) bridge across Conclusion Creek; (VIII) road from Bolondron to Guira and Zapata; (IX) water supply for Limonar; (X) inspection of railroads.

#### I. HIGHWAY FROM MATANZAS TO CANASI.

At the end of the past fiscal year there were 3,700 linear meters of road graded in which the Telford foundation had been laid. The rolling of the roadway reached 4,100 linear meters; 1,450 linear meters of the road macadamized and rolled. The works were continued in the same form by administration during the half year, and on the 10th of December last a section of the highway, 5 kilometers in length, was finished. Therefore, the works related in the annexed statement No. 1 refer to 1,300 linear meters of road graded and bottom course laid; 3,650 linear meters of road macadamized and rolled. The 120 cubic meters of hydraulic masonry were employed in the construction of 5 drains 1 meter deep and 1 meter wide; the 11 cubic meters of dry masonry were employed in the drains and for retaining walls on the slope of



embankments at the ends of drains. The survey of  $11\frac{1}{2}$  kilometers comprises the first 8 kilometers of highway, and  $3\frac{1}{2}$  of line rejected. At the finishing of kilometer No. 5, on the 10th of December, the works on the highroad were suspended and the survey of kilometers 6, 7, and 8 was immediately commenced as preliminary work for the preparation of the necessary project of that section of the road, the construction of which was to be offered at public auction. The direction-general has approved that the building of the remaining 27 kilometers of this road to Canasi be offered at public auction in successive sections, each of an approximate length of 3 kilometers, ordering that the necessary projects be drafted uninterruptedly. If the necessary credit is granted during the present fiscal year it is probable that two sections, of 3 kilometers each, will be finished at a cost of \$54,000, \$9,000 per kilometer, including mechanical structures.

## II. DREDGING OF BUBA CHANNEL, BAY OF CARDENAS.

During the half year this head office has prepared the definitive project of this work, selecting one of the channels proposed in the preliminary project. In the first days of December proposals for this work was advertised in foreign and domestic papers. Auction will take place on the 31st of the present month with great concurrence, judging from the number of persons, more than 12, who have applied for information. The dredging of Buba channel is a work of capital importance to Cardenas and to the large zone of the Cardenas and Jucaro Railroad. By this dredging, vessels can take and clear the Poza in 7 meters of water. But between the Poza anchoring ground, at the south end of the channel, and the wharves of Cardenas lies the bay, 12 kilometers wide, and this distance must be covered with barges. Therefore, the dredging of Buba channel, though of great importance, does not solve the problem of making of Cardenas a cheap port. The works projected must be completed with others to avoid the necessity of using the barges. Said works are practicable. They consist of a wharf, which can be built in the littoral of Hicacos cove, and of a railroad from said wharf to the warehouses of Cardenas. The wharf could be made by the state, the railroad by the Cardenas and Jucaro Company. To the English engineer who recently inspected the Cardenas and Jucaro road with the object of reporting to a syndicate which desires to buy the road, did not escape the necessity of prolonging the line to the cove of Hicacos, and stated that the syndicate mentioned would do it provided the purchase was made.

## III. ROAD FROM MATANZAS TO CIDRA AND SANTA ANA.

The preliminary survey of this road, commenced on the last days of May, was finished and the fore project was drafted. Of this preliminary survey  $22\frac{1}{2}$  kilometers correspond to this half year, including exploration lines abandoned. Besides, the field work for the definitive study of the first 3 kilometers has been finished, and at present the drafting of the definitive project which is to serve as a base for proposals and construction of said section is nearly finished. An appropriation of \$30,000 has been granted to commence this highway, and this amount is considered sufficient for the first section of 3 kilometers. This first section of the public road now in use is at present in a very bad condition for traffic. It is the worst of the whole tract. The road goes over a cragged land with slopes sometimes reaching 7 per cent. Referring to the remaining 12 kilometers up to the town of Cidra, I recommend that the section from kilometers 4 to 9, both included, be repaired only, draining and grading the road in some portions. This section in its greater part is level and the soil is hard, there appearing only one isolated slope of about 4 per cent. This section can be built at a price of \$8,000 per kilometer. The branch to Santa Ana of a length of  $3\frac{1}{2}$  kilometers goes through the San Juan Valley on a vegetable ground crossed by streams. It is very important, because it will serve for a zone in which cane and minor cultures will obtain great increment. I recommend that at the beginning of work on the first section the engineer inspector be charged with the repairing by administration of the following section, kilometers 4, 5, 6, 7, 8, and 9, and also of the definitive laying out of kilometers 10 to 15 and of the branch to Santa Ana. Near kilometer 10 the road is crossed by La Vieja Creek, requiring a bridge of 16 meters span. At least the building of this bridge and its approaches will become necessary for the traffic of Cidra and Santa Ana.

## IV. SAN LUIS BRIDGE IN MATANZAS.

During the half year this head office obtained the necessary field data and drafted the fore project for the establishment of this bridge across river San Juan. This fore project, returned with remarks in November last, was again redacted by the under-

signed in December. The cost of this bridge will probably amount to \$122,500. The building of it is pressing, inasmuch as the provisional wooden bridge now in use is in a period of decay, and having several piles in the bed of the river the date can not be predicted when the swelling of the river will destroy it after flooding Pueblo Nuevo.

#### V. INUNDATION OF ROQUE AND RECREO.

This head office made a reconnoissance of the territories where floods of the Roque and Recreo periodically occur, giving information of the causes and means for averting them, and approximate cost of the minute survey which was recommended. This matter is pending new information requested by the "direccion general," which has not been forwarded as yet, owing to the lack of time for making a new reconnoissance of the territories mentioned. It is useless for me to repeat the necessity of the works to free the country from such floods. Those floods are disastrous, not only for the destruction of cultures but also for the malarial fevers which afflict the inhabitants on account of the emanations of the stagnant waters. During the whole past century the project of draining the country has arisen at every great inundation. The different solutions proposed in the past are not founded on a minute investigation. A commission should be appointed to make an ample study, redacting afterwards the corresponding project. The appropriation needed amounts to \$8,000.

#### VI. MARKET OF MATANZAS.

As a base for the project of the new market for Matanzas this head office drafted the plan of the existing market and obtained the profiles of the adjoining streets and grounds upon which the old building is standing.

#### VII. BRIDGE ACROSS CREEK CONCLUSION.

For the reconstruction of this bridge this head office made a reconnoissance of the ruins of same and redacted a fore project. There is an appropriation granted amounting to \$1,100. This head office proposes to offer this work at public auction and to this end the corresponding project will be redacted very soon.

#### VIII. ROADS FROM BOLONDON TO GUIRA AND ZAPATA.

After reconnoissance of these roads this head office informed that the highway from Bolondron to Guira was not of an urgent character, but that the road from Bolondron to Cienaga de Zapata ought to be established. This office does not sustain to-day such opinion, as the reduced energies of the department can be directed to works of greater public necessity.

#### IX. WATER SUPPLY FOR LIMONAR.

The furnishing capacity of the well to be utilized has been calculated and a fore project of the required works has been redacted, recommending that they be offered at public auction in accordance with a definitive project.

#### X. INSPECTION OF RAILROADS.

This head office has inspected the road, buildings, equipment, and shops of the Cardenas and Jucaro and Matanzas to Sabanilla railroads, and has informed in two applications for concessions—one for a road of public interest and one for private use. No accident of greater importance has happened requiring a reconnoissance. In general the accidents were imputable to the ruined state in which the roads appeared after the war. The reconstruction of the roads advances slowly, at the same gait as the sugar industry, and it would be difficult to pretend to hasten it. But this is not the cause; only certain deficiencies in the management are noted. It results that the greatest mileage of transportation of cane and sugar during the period of the crop is made on trains not scheduled, this office having no knowledge of them. Some of these trains are private property. They belong to several sugar plantations, and in some cases they are in charge of the employees of the plantations. All these trains take and leave the general track between stations. Of course these managements are productive of accidents, and as the idea is to avoid them the attention of the companies should be called to the following: First, if the companies are directly responsible for all the traffic on the roads, the conductor and engineer of every train running over them should be employees of the companies and responsible to them.

Secondly, that being the exploitation by sections limited by legally established stations, a section is considered occupied meantime a train is running over it and has not left it by one of the extreme stations or by a siding or switch. No train shall go over a section before it is left by another, except for offering help in cases of accidents. The declaration of free track should be made only by the chiefs of the two extreme stations.

PUBLIC WORKS WHICH SHOULD BE ACCOMPLISHED.

They are many and of different characters. Besides those referred to in the report, I recommend as of greater utility the building of a highway on the road from Cardenas to Matanzas, especially in the half way near Cardenas, because this trajet crosses the zone which furnishes Cardenas with country produce, and where two central sugar states exist. I annex four statements: (I) expenses; (II) works effected; (III) salaries and wages paid; (IV) prices of materials furnished.

Yours, respectfully,

D. LOMBILLO CLARK, *Chief Engineer.*

DIRECTOR-GENERAL OF PUBLIC WORKS, *Habana.*

I.—*General résumé of the expenses incurred for services, works, and surveys in the province of Matanzas, district of Matanzas, during the half year from July 1 to December 31, 1900.*

Concepts.	Wages.	Material.	Services.	Total amount.	Direction.	
					Amount salaries.	Percentage of total amount.
Repairson road from Matanzas to Canasi.....	\$9,224.10	\$12,338.49	\$2,109.60	\$23,672.19	\$2,799.89	11.82
General surveys.....	820.25	1,155.34	395.25	2,370.84	1,928.99	81.35
Surveys, inundations at Roque.....			41.59	41.59		
Expenses inspection of railroads.....			24.45	24.45		
Total.....	10,044.35	13,493.83	2,570.89	26,109.07	4,728.88	18.11

Concepts.	Total amount, including direction.	Inspection and administration.		Total amount, including direction, inspection, and administration.
		Amount.	Percentage of total amount.	
Repairs on road from Matanzas to Canasi ..	\$26,472.08	\$2,709.93	11.447	\$29,182.01
General surveys .....	4,299.83	271.41	11.447	4,571.24
Surveys, inundations at Roque .....	41.59	4.76	11.447	46.35
Expenses inspection of railroads .....	24.45	2.80	11.447	27.25
Total.....	30,837.95	2,988.90	11.447	33,826.85

*Detail of expenses for inspection and administration.*

Head office public works:

Personnel.....	\$2,689.98
Material .....	124.92
House rent.....	174.00
Total.....	2,988.90

II.—*Statement referring to works accomplished in the province of Matanzas, district of Matanzas, during the half year from July 1 to December 31, 1900, expressing price per unity and unities performed by wages.*

Repair of the road from Matanzas to Canasi.	Rock excavation of every kind.	Earth excavation of every kind.	Digging of ditches.	Stone embankments.	Earth embankments.	Stones crushed, carted, and spread.	Stones for foundation, Telford.
	m. <sup>3</sup>	m. <sup>3</sup>	m.	m. <sup>3</sup>	m. <sup>3</sup>	m. <sup>2</sup>	m. <sup>2</sup>
Before.....	8,365	3,608	2,644	10,615	.....	15,899	34,635
In the half year.....	1,044	5,367	8,065	1,285	2,156	24,466	6,511
Total up to date.....	9,409	8,975	10,699	11,900	2,156	40,365	41,146
Price per unity of work, including inspection and administration.....	\$1.22	\$0.28	\$0.22	\$0.77	\$0.33	\$0.48	\$0.37
Wages paid during the half year.....	127.11	944.16	1,172.08	212.60	421.02	2,494.23	1,086.60
Unities performed per wage.....	7	4.8	5.8	5.1	4.3	8.3	5

Repair of the road from Matanzas to Canasi.	Rolling.	Borders.	Hydraulic masonry.	Paving of ditches.	Dry masonry.	Cleaning and maintenance.	Staking.
	m. <sup>2</sup>	m.	m. <sup>3</sup>	m.	m. <sup>3</sup>	m.	Kilometers.
Before.....	32,559	6,334	444	.....	.....	.....	3½
In the half year.....	34,617	2,224	120	1,703	11	5,000	8
Total up to date.....	67,176	8,558	564	1,703	11	5,000	11½
Price per unity of work, including inspection and administration.....	\$0.05	\$0.53	\$14.68	\$1.11	\$5.34	\$0.15	\$71.00
Wages paid during the half year.....	964.71	243.85	320.76	489.73	8.53	305.22	443.50
Unities performed per wage.....	31	7.7	0.3	3	1.1	14	6.7

The unities performed by wage are calculated upon an average wage of \$0.85.

III.—*Statement referring to salaries and wages paid in works and survey in the province of Matanzas, district of Mantanzas, during the half year from July 1 to December 31, 1900.*

	Office of chief engineer of the district.	Repair of road from Matanzas to Canasi.	Survey of road from Matanzas to Cidra.	Study of bridge San Luis.	Project of the new market.
Per year:					
Chief engineer.....	\$2,500.00	.....	.....	.....	.....
Chief clerk.....	1,800.00	.....	.....	.....	.....
Typewriter.....	720.00	.....	.....	.....	.....
Per month:					
Orderly.....	360.00	.....	.....	.....	.....
Engineer in charge.....	.....	\$150.00	\$150.00	.....	.....
Assistant.....	.....	100.00	100.00	.....	.....
Clerk.....	.....	66.66	.....	.....	.....
Levelman.....	.....	60.00	60.00	.....	.....
First chainman.....	.....	60.00	60.00	.....	.....
Second chainman.....	.....	.....	40.00	.....	.....
Crushing machine foreman.....	.....	66.66	.....	.....	.....
Timekeeper.....	.....	66.66	.....	.....	.....
Storekeeper.....	.....	45.00	.....	.....	.....
Per day:					
Engineer.....	.....	2.50	.....	.....	.....
Assistant engineer.....	.....	1.50	.....	.....	.....
Blacksmith.....	.....	1.40	.....	.....	.....
Assistant blacksmith.....	.....	1.00	.....	.....	.....
Mason.....	.....	1.50	.....	.....	.....
Carpenter.....	.....	1.25	.....	.....	.....
Foreman.....	.....	1.50	1.00	\$1.00	\$1.50
Assistant foreman.....	.....	1.00	.....	.....	.....
Fireman.....	.....	1.50	.....	.....	.....
Draftsman.....	.....	2.00	.....	2.50	.....
Helper.....	.....	.....	.....	2.50	.....
Stone receiver.....	.....	.80	.....	.....	.....
Overseer crushing machine.....	.....	.80	.....	.....	.....
Stone spreaders.....	.....	.70	.....	.....	.....
Watchmen.....	.....	.80	.....	1.00	.....

III.—*Statement referring to salaries and wages paid in works and survey in the province of Matanzas, etc.*—Continued.

	Office of chief engi- neer of the district.	Repair of road from Matanzas to Canasi.	Survey of road from Matanzas to Cidra.	Study of bridge San Luis.	Project of the new market.
Per day—Continued.					
Watermen.....		\$0.50			
Hammerman.....		1.00			
Cartman.....		1.00			
Stakeman.....		.80			
Messenger.....		.80	\$1.00		
Stableman.....		.80			
Diggers.....		.80			
Laborers.....		.70			\$0.80
Survey laborers.....		1.00	.90	\$1.00	1.00
Laborers, road repairing.....		.80			
Mechanic.....		2.50		1.50	1.50
Oilman.....		.50			
Water cartman.....		1.00			
Water cartman, assistant.....		.70			
Woodman.....		.70			
Mate.....				1.00	
Sailor.....				1.00	
Road keepers.....		.80			
Rodman.....					1.50

IV.—*Statement referring to prices of material used in works in the province of Matanzas, district of Matanzas, during the half year from July 1 to December 31, 1900.*

HIGHWAY FROM MATANZAS TO CANASI.

Round iron.....per kilo..	\$0.12	Square iron shovels.....each..	\$1.00
Nails.....do.....	.11	Prepared paint.....per kilo..	.43
Wooden wheelbarrows.....each..	3.50	Bituminous coal.....per ton..	6.84
Cement.....per cubic meter..	40.00	Machine oil.....per gallon..	.60
Crushed stone.....do.....	1.45	Cotton waste.....per kilo..	.21
Rough stones.....do.....	1.04	Paper, blue process.....per roll..	3.53
Stone chips.....do.....	1.10	Blasting powder.....per kilo..	.43
White pine.....do.....	14.15	Blasting fuse.....per 1 000 feet..	5.00
Yellow pine.....do.....	10.59	Tallow.....per kilo..	.17
Sheet iron.....per kilo..	.08	Sheet zinc.....do.....	.21
Old rails.....do.....	.016	Tin cartridges for blasting.....each..	.10
Galvanized-iron pails.....each..	.50	Caliche.....per cubic meter..	.50

*Report submitted relative to the work accomplished by this office during the second half of the year July 1 to December 31, 1900.*

SANTA CLARA, January 21, 1901.

HONORABLE SIR: Pursuant to your directions I have the honor to submit for your consideration my semiannual report from July 1 to December 31, stating that on taking possession of my office as chief engineer of the district, on the 22d of November last, a change of the chief clerk and paymaster was taking place, which change has delayed the dispatch of business in this head office, but it is expected that very soon it will reach the readiness and punctuality which must exist in every district. The works in this district have increased considerably in the last six months and are still increasing daily; the work is steady and the personnel is obliged to render services at extra hours, but they all fulfill their duties cheerfully in every possible way, in order to maintain the credit and consideration granted by the people of this province to this head office for the exertions realized. Survey commissions Nos. 1 and 2 have been constantly engaged in field work during the last six months ending December 31.

COMMISSION No. 1.

On the 1st of July this commission was surveying the road from Santa Clara to Camajuani, which survey was commenced on the 16th of May of the same year; this survey, with an approximate length of 30 kilometers, was made in a preliminary form. When this survey was finished the commission started, the first fortnight of September, to study the drainage of the town of Camajuani, which was necessary to ascertain the area of the land periodically flooded in the vicinity of said town; this was done also in a preliminary form. When this survey, which included the leveling of the streets of the town, was ended the commission was charged with the survey

of the road from Remedios to Caibarien, commencing this work on the 19th of November and finishing on the 7th of December. It was also done in a preliminary form. The road has an approximate length of 11 kilometers. On the 10th of December this commission was formed of the auxiliary engineer, Señor Nasses, and levelman, Señor Amigo, the assistant, Señor Muñagorí, being at the time absent under license on account of sickness. These two gentlemen were ordered to Santo Domingo to make the necessary study for the report referring to the request for an appropriation intended for the construction of the waterworks required to supply said town with water. The commission was engaged in this work on the 31st of December. For the drafting of the necessary project, estimates and plans to offer at public auction the several works related, the following data are on hand at this head office: Road from Santa Clara to Camajuani; plans, profiles, field books, and other data. Drainage of Camajuani; field books and plans. Leveling of the streets of Camajuani; plans and field books. The corresponding office work certainly should have been done by the same commission, but owing to the numberless field works to be accomplished, all bearing more or less an urgent character, it has been impossible for the commission to stop at this office to perform said works, and consequently the indulgence of the department is expected as to the delay in remitting the corresponding projects, which at all events will be forwarded as soon as possible. Neither has it been possible to commit said work to the personnel of this head office, as it has been constantly employed in the preparation of other projects. Annexed please find statements of expenses and works accomplished during six months from the 1st of July to the 31st of December.

#### COMMISSION No. 2.

Owing to the great number of works and general surveys pending in this district, commission No. 2 was organized in July, commencing the field work of the road from Caunao to Manicaragua on the 7th of August. This work was slow on account of many obstacles, viz, the necessary deviations to determine the best route and the constant rain which checked the progress of the survey. A great portion of the work was carried on through untraveled land covered with wild vegetation and exceedingly high and close grass, which required long cuts and the opening of paths. The first part of the work was finished in a preliminary form in the first fortnight of October; and on the 15th the survey of the first portion from Caunao to Lagunillas was commenced. This is carried on in a definitive way. On the 1st of December the commission was surveying the second section of the road from Caunao to Manicaragua. This commission has made also the necessary special studies for the projects of bridges in several sections of the road, and in December Señor Ramos, auxiliary engineer, accompanied by his assistant, started to the place fixed on the banks of river Manatí to make the necessary study with profiles and plans for the construction of a barge or pontoon for crossing the river, of which he forwarded also the corresponding specifications.

#### ROAD FROM CAUNAO TO MANICARAGUA.

This road has an approximate length of 50 kilometers, commences at Caunao, passes by Los Guayos and Cumanayagua, ending at Hoyo de Manicaragua. It is subdivided into three sections: First, from Caunao to Los Guayos; second, from Los Guayos to Cumanayagua, and, third, from Cumanayagua to Hoyo de Manicaragua. For the repair of this road an appropriation amounting to \$50,000 was granted, of which \$28,340 was allotted to bridge work and the balance to ditches, approaches, and filling up holes. From the time the work was commenced the seven bridges of the first section have been built, as well as the one over Hanabanilla in the third section. Additional work has also been performed on the last, and a 6-meter span was added to the bridge over Rosario River of the first section. Contractor Ferreiro besides has accumulated, near the opening selected by Castillo, which was changed afterwards, all the material for the bridge projected over Arimao River. The project for building a steel bridge instead of a wooden one in this place is still pending approval. The grading of roads, which sometimes requires considerable earthwork, without definitively building up at once the roadbed as it was carried on, was stopped, on account of the bad results obtained. The works then were reduced to the construction of bridges, culverts, ditches, and approaches in a definite shape, including excavations and embankments either of stone or earth. The annexed statement shows the personnel employed and salaries and wages paid, as well as the works accomplished, and total amount of expenses during the six months from July 1 to December 31, 1900. For the sake of better service the office pertaining to this road was ordered to move from Cienfuegos to the town of Caunao. On the 5th of December the engineer in charge was ordered to establish within the least possible time the openings of culverts and pontoons in

the section from Cumanayagua to Hoyo de Manicaragua, determining the profiles of all crossways to fix at this office the corresponding dimensions in view of the data furnished. On the 3d of November the honorable military governor approved a credit amounting to \$75,000 for the roadbed of the first section of this road, work which will be offered at public auction, in lengths of 3 or 4 kilometers, as soon as possible. During these six months the bridges and pontoons expressed in the accompanying statement have been built and received, the gangs having been employed principally in the works of approaches to same and in building up culverts, ditches, and clearing the road.

#### ROAD FROM PLACETAS TO SANCTI SPIRITUS.

For repairs on this road an appropriation was made amounting to \$80,241.50. At the beginning of these six months four gangs of twenty-five men each, and the corresponding foremen, were at work, one inspector having been appointed for every two gangs. The work consisted in the grading and cleaning of the road in the four sections into which it is subdivided: First, from Sancti Spiritus to river Tuinicu; second, from river Tuinicu to Cuatro Caminos; third, from Cuatro Caminos to river Calabazas, and, fourth, from river Calabazas to Placetatas, passing by Hernando. The road starts at Sancti Spiritus, passes by Los Guayos, Cabaiguan, Cuatro Caminos, and Hernando, and ends at Placetatas with an approximate length of 70 kilometers. Grading has also been done on both sides and near Rio Calabazas, and on La Fragua and Cayajacos hills. At the same time the study was carried on in a conclusive form to offer at public auction the jobs of grading and building up the roadbed by sections. Afterwards the four gangs were moved to the two first sections to be engaged in repairs of impassable places in the vicinity of Sancti Spiritus and river Tuinicu. The studies, plans, profiles, and waterways of the first and second sections are at hand in this head office, and the works will be offered at public auction at the earliest possible date. The bridge over river Tuinicu was bidden at public auction, but the bid having not been approved by the higher authorities, it has been proposed a second time. At the commencement of these six months the works did not advance as was desirable, owing to the unsteadiness of the laborers which we were forced to gather among the cattlemen of Sancti Spiritus and their being unaccustomed to that kind of work, and to the constant and heavy rains that often stopped the work and which at times did considerable damage to that finished or in progress, as well as to the fact that the only centers of life, civilization, and commerce, were at the ends of the long tract of 70 kilometers, and to the difficulties of transportation. Owing to the bad results obtained in the work of grading as mentioned, two gangs with two foremen and one inspector were dismissed, and the remaining two were employed in quarrying and transporting slabs and stones for ditches, culverts, approaches, etc. The personnel pertaining to this road, on the 31st of December, consisted of—

1 auxiliary engineer.....	\$150.00
1 assistant.....	100.00
1 amanuensis.....	60.00
1 inspector.....	83.33
2 foremen, at \$45 each.....	90.00
Total.....	483.33

I also annex a statement of work executed and expenses defrayed during the six months from July 1 to December 31, 1900.

#### ROAD FROM TRINIDAD TO CASILDA.

The works on this road, which were in progress under the supervision of the engineers of the military governor, were received, as per report filed in this office, by the department of public works on the 1st of August, 1900. The works performed up to that date were 2,637 meters of the high road already finished, including grading, drainage, and roadbed, with widths varying from 5 to 7.3 meters at different sections; one culvert, 1.50 meters stretch and 1 meter high, masonry abutments and roadway of iron rails, and one brick culvert of doubtful stability. The cost of these works amounted to \$19,147.65. The balance of the works to be effected at that time to finish the road consisted of 2,134 meters, with two culverts. The width of the roadbed was reduced to 5 meters, except in passing through the town of Casilda, where it reaches a width of 8 meters. The high road was finished on the 31st of December. I forward herewith statement of expenses and works performed on this road.

#### WATER SUPPLY FOR CASILDA.

The honorable military governor on the 1st of December granted an appropriation, amounting to \$3,300, for supplying with water the town of Casilda. On the

10th of the same month the work of laying down a section of 1,800 feet of 3-inch piping from Trinidad to the railroad track was commenced, in order to carry the water on cars to Casilda while the pipes were laid. These cars are already carrying water from Trinidad to Casilda, and 7,488 feet of pipe have been purchased. The balance, amounting to 10,512 feet, will be purchased in January, 1901. There will be no fear of lack of water in Casilda from this date. I forward herewith statement of works executed and expenses defrayed up to December 31, 1900.

#### REPAIRING OF THE STREETS OF SANCTI SPIRITUS.

On the 2d of November an appropriation, amounting to \$25,000, was granted for repairing the streets of Sancti Spiritus. The work was commenced on the 17th of December with a gang of 25 men, which was increased in accordance with the requirements of the work. The ayuntamiento has loaned for these works a good steam roller and a stone-breaking machine. During the few days from the 17th to the 31st very little has been done, as always occurs at the beginning, but at present everything is in good working order, and the works are progressing rapidly.

#### BRIDGE AT RODAS.

This bridge is built across the Damuji River at Rodas, and was finished in August, 1900. The contract for construction of this steel bridge was granted at public auction to Mr. Emilio Delmonte. It has been built in three sections. One central, Pratt system, with a span of 45.4 meters, and two side sections, Latice system, with spans of 16.76 meters, and has two piles and two stone abutments. To open this bridge to public traffic it is necessary only to accomplish the additional works projected, and which will be offered at public auction on the 15th of January, 1901. The appropriation for this work amounted to a total of \$28,600, it having been increased \$2,900 for additional works.

#### BARGE FOR CROSSING RIVER DAMUJI.

For this work an appropriation amounting to \$4,000 was granted by the honorable military governor in the month of July. Owing to other projects which were considered of greater importance this office did not commence to draft the project of this barge until the middle of November, having forwarded to the director-general for approval, in the first days of January, the project complete in all its details as well as specifications and forms for advertisements and for proposals. It is expected that this work can be commenced about the 1st of March.

#### OFFICE OF THE CHIEF ENGINEER.

The office work has considerably increased; to such extent that it has been impossible to comply with all the requisites of the department. I take great pleasure in mentioning with approbation the conduct of the personnel of this office, which has been always ready and willing to render services at first notice regardless of time, everybody being anxious to fulfill the duties to him committed and to cooperate to the benefit of the service. A statement referring to the personnel and expenses corresponding to the half year is herewith forwarded.

#### INSPECTION OF RAILROADS.

In regard to this service, I can only report that in reality such does not and can not exist until the corresponding authority is given for the appointment of at least one auxiliary inspector, which authorization I take the liberty to recommend be given at once, so that such branch service, dormant at present, may be fulfilled in an efficient manner, inasmuch as it is impossible to commit said service to the overburdened personnel of this office.

#### REQUISITION OF FUNDS.

It has not been considered convenient to make the requisition of funds necessary for the completion of the several works in progress, for the following reasons:

In the repairs of the road from Caunao to Manicaragua the total amount of the first allotment for said work has been nearly exhausted. A new credit, amounting to \$15,000 for the roadbed of the first section, has lately been assigned, and it has been considered advisable to advance the work so as to calculate with more accuracy the approximate cost of the sections in study before making the necessary requisitions, provided we have time enough to make said requisitions with the anticipation required by the progress of the works.



In regard to the remaining bridges, pontoons, and culverts, it is necessary to wait for the finishing of the estimates thereof so that they may be offered at public auction one by one or in sets, according to the importance of the works.

From the appropriation for the road from Placetas to Sancti Spiritus, about \$20,000 have been invested, which amount, added to the \$27,000, approximate value of the bridge across Tuinicu River, gives a total amount of \$41,000 expended, there remaining a balance of \$33,241, sufficient to commence the first section of the road. If the repairs on this road are to be made according to the Macadam and Telford-Macadam systems, the total amount, including bridges, pontoons, culverts, etc., will not fall under \$700,000. Deducting from these figures \$80,241.50 already appropriated, a balance of \$619,758 is required to finish the high road; but it is not deemed advisable to make further requisitions until obtaining more accurate and complete data.

The two commissions and other works have fixed credits or appropriations for the totality of the work. In some cases the works not having been commenced, and only recently in some, it can not be said whether the credits are sufficient for finishing them, although it is assumed that in most of the cases they are.

## REMARKS.

As this report covers a period of six months from July 1 to December 31, 1900, and the undersigned having taken possession of his office on the 22d of November, it has been necessary to recur in every instance to the records of the office to obtain the required data—a slow and tedious work owing to the bad shape in which the records were found—and hence the omission of data which it would have been desirable to forward. Also, on account of the increase of work in this district it has been impossible for the undersigned to find the necessary time to prepare, in accordance with his desire, a more elaborate, minute, and complete report.

Yours, respectfully,

JUAN G. PEOLI,  
Chief Engineer.

The SECRETARY OF PUBLIC WORKS, *Habana.*

*Monthly report of progress of work.*

## GENERAL SURVEYS, COMMISSION NO. 1.

Kind of survey.	Unit.	Executed.	Cost of—				Cost per unit.
			Per-sonnel.	Material.	Sundries.	Total.	
July, 1900:							
Road from Santa Clara to Camajuani, aligned, staked, and leveled .....	Kilom ..	7,000	\$529.22	\$112.53	\$52.36	\$694.11	\$99.16
August, 1900:							
Road from Santa Clara to Camajuani, aligned, staked, and leveled .....	Kilom ..	8,380	518.35	10.11	82.25	610.71	72.87
September, 1900:							
Drainage of the town of Camajuani, aligned, staked, and leveled .....	Kilom ..	9,678	799.50	16.49	47.62	863.61	89.23
Earth excavation .....	M <sup>3</sup> .....	1,321	914.01	61.22	28.00	1,003.23	.760
Embankments .....	M <sup>3</sup> .....	1,075	818.78	58.00	26.73	903.51	.840
Bridges .....	Number ..	1	.....	.....	.....	4,608.00	.....
Culverts .....	Number ..	4	.....	.....	.....	1,860.00	.....
Total .....			1,732.79	119.22	54.73	8,374.74	.....
October, 1900:							
Shaping .....	M <sup>1</sup> .....	23	18.78	.01	14.01	32.80	1.430
Earth excavation .....	M <sup>3</sup> .....	1,809	1,108.10	14.90	183.19	1,306.19	.720
Embankments .....	M <sup>3</sup> .....	881	961.25	2.44	108.61	1,072.30	1.210
Lengthening of bridges .....			.....	.....	.....	413.70	.....
Total .....			2,088.13	17.35	305.81	2,824.99	.....
November, 1900:							
Ditches cleaned .....	M <sup>1</sup> .....	130	25.60	.68	.53	26.77	.206
Earth excavation .....	M <sup>3</sup> .....	3,569	1,408.50	36.32	259.44	1,704.26	.477
Embankments .....	M <sup>3</sup> .....	916	732.90	16.38	207.80	957.08	1.044
Lengthening of bridges .....			175.80	.....	.....	175.80	.....
Total .....			2,342.80	53.38	467.77	2,863.91	.....

*Monthly report of progress of work—Continued.*

## GENERAL SURVEYS, COMMISSION NO. 2.

Kind of survey.	Unit.	Executed.	Cost of—				Cost per unit.
			Per- sonnel.	Material.	Sundries.	Total.	
August, 1900: Laying out the road from Caunao to Manicaragua, aligned, staked, and leveled.	Kilom ..	4,020	\$555.50	\$359.27	\$31.20	\$945.97	\$235.31
September, 1900: Laying out the road from Caunao to Manicaragua, aligned, staked, and leveled.	Kilom ..	8,950	730.98	45.11	21.00	797.09	89.06
October, 1900: Laying out the road from Caunao to Manicaragua, aligned, staked, and leveled.	Kilom ..	6,730	727.81	481.80	22.37	1,231.98	183.05

## ROAD FROM PLACETAS TO SANCTI SPIRITUS.

July, 1900:							
Earth excavation .....	M <sup>3</sup> .....	1,629	\$892.04	\$70.47	\$33.16	\$995.67	\$0.61
Rock excavation .....	M <sup>3</sup> .....	10	18.95	1.37	.66	20.98	2.10
Embankments .....	M <sup>3</sup> .....	1,490	766.18	59.39	27.96	853.53	.57
Repairs on dry masonry .....	M <sup>3</sup> .....	24	95.27	6.90	3.25	105.42	4.37
Total .....			1,772.44	138.13	65.03	1,975.60	.....
August, 1900:							
Earth excavation .....	M <sup>3</sup> .....	3,207	1,473.01	105.77	42.08	1,620.86	.505
Rock excavation .....	M <sup>3</sup> .....	424	142.75	11.07	3.82	157.64	3.68
Embankments .....	M <sup>3</sup> .....	3,320	1,181.91	84.61	34.88	1,301.00	.392
Total .....			2,797.67	201.45	80.78	3,079.50	.....
September, 1900:							
Earth excavation .....	M <sup>3</sup> .....	877½	749.54	45.47	18.45	813.46	.925
Rock excavation .....	M <sup>3</sup> .....	801	273.19	16.42	6.66	296.27	3.67
Embankments .....	M <sup>3</sup> .....	944	1,069.08	64.41	26.16	1,159.65	1.23
Total .....			2,091.81	126.30	51.27	2,269.38	.....

## ROAD FROM CAUNAO TO MANICARAGUA.

July, 1900:							
Clearing of the road .....	M <sup>1</sup> .....	293	\$37.54	\$2.12	\$0.68	\$40.34	\$0.140
Shaping .....	M <sup>1</sup> .....	1,295	86.14	4.86	2.54	93.54	.070
Ditches cleaned .....	M <sup>1</sup> .....	1,864	62.01	3.46	2.11	67.58	.035
Earth excavation .....	M <sup>3</sup> .....	657	404.44	23.00	9.29	436.73	.665
Rock excavation .....	M <sup>3</sup> .....	106	162.42	9.19	4.98	176.59	1.665
Embankments .....	M <sup>3</sup> .....	1,897	1,093.60	62.12	59.00	1,214.72	.646
Dry masonry .....	M <sup>3</sup> .....	4½	34.85	1.91	15.66	52.42	11.650
Stone crushed and spread .....	M <sup>3</sup> .....	56	64.21	3.47	2.20	69.88	1.028
Total .....			1,945.21	110.13	96.46	2,151.80	.....
August, 1900:							
Ditches cleaned .....	M <sup>1</sup> .....	696	87.63	.41	1.29	89.33	.130
Earth excavation .....	M <sup>3</sup> .....	764	277.18	3.33	5.34	285.85	.375
Embankments .....	M <sup>3</sup> .....	3,283	1,770.44	11.02	126.37	1,907.83	.580
Dry masonry .....	M <sup>3</sup> .....	96	96.03	.66	29.26	125.95	1.031
Total .....			2,231.28	15.42	162.26	2,408.96	.....
October, 1900:							
Drainage of the town of Camajuani, aligned, staked, and leveled.	Kilom ..	30,000	594.80	711.49	55.11	1,361.40	45.38
November, 1900: Road from Remedios to Caibarien, aligned, staked, and leveled.	Kilom ..	12,409	780.37	288.42	26.39	1,095.18	82.25
December, 1900: Road from Remedios to Caibarien, measured and leveled.		1,000	311.15	24.05	12.05	347.25	347.25
Water supply to Santo Domingo.			178.24	.....	4.94	183.18	.....
Total .....			489.39	24.05	16.99	530.43	.....

*Monthly report of progress of work—Continued.*

## ROAD FROM CAUNAO TO MANICARAGUA—Continued.

Kind of survey.	Unit.	Executed.	Cost of—				Cost per unit.
			Per-sonnel.	Material.	Sundries.	Total.	
<i>Semiannual résumé, July 1 to December 31, 1900.</i>							
Road from Santa Clara to Camajuani.	Kilom ..	15,380	\$1,047.57	\$122.64	\$134.61	\$1,304.82	\$84.83
Drainage of the town of Camajuani.	Kilom ..	39,678	1,394.30	727.98	102.73	2,225.01	56.07
Road from Remedios to Caibarien.	Kilom ..	13,407	1,091.52	312.47	38.44	1,442.43	107.53
Water supply for Santo Domingo.	.....	.....	178.24	.....	4.98	183.18	.....
Total .....	.....	.....	3,711.63	1,163.09	280.76	5,155.44	.....
December, 1900:							
Earth excavation .....	M <sup>3</sup> .....	997	451.61	4.20	26.09	481.90	.480
Embankments .....	M <sup>3</sup> .....	1,478	1,097.28	6.27	273.16	1,376.71	.930
Repairs on bridges .....	.....	.....	74.20	24.00	30.00	128.20	.....
Total .....	.....	.....	1,623.09	34.47	329.25	1,986.81	.....
<i>Semiannual résumé, July 1 to December 31, 1900.</i>							
Clearing of the road .....	M <sup>1</sup> .....	293	37.54	2.12	.68	40.34	.137
Shaping .....	M <sup>1</sup> .....	1,318	104.92	4.87	16.55	126.34	.095
Ditches cleaned .....	M <sup>1</sup> .....	2,690	175.30	4.55	3.93	183.78	.068
Earth excavation .....	M <sup>3</sup> .....	9,117	4,563.84	142.97	511.35	5,218.16	.572
Rock excavation .....	M <sup>3</sup> .....	106	162.42	9.19	4.98	170.59	1.666
Embankments .....	M <sup>3</sup> .....	9,530	6,474.25	156.23	801.67	7,432.15	1.799
Dry masonry .....	M <sup>3</sup> .....	100½	130.80	2.57	44.92	138.37	1.774
Stone crushed and spread .....	M <sup>3</sup> .....	56	64.21	3.47	2.20	69.88	1.248
Lengthening of bridges by contract.	.....	.....	.....	.....	.....	413.70	.....
Lengthening of bridges by administrative department.	.....	.....	175.80	.....	.....	175.80	.....
Repairs on bridges .....	.....	.....	74.20	24.00	30.00	128.20	.....
Bridges received—contract .....	Number	1	.....	.....	.....	4,608.00	.....
Culverts received—contract .....	Number	4	.....	.....	.....	1,860.00	.....
Total .....	.....	.....	11,963.28	349.97	1,416.28	20,565.31	.....
November, 1900:							
Laying out the road from Caunao to Manicaragua, aligned, staked, and leveled.	Kilom ..	7,400	731.20	82.64	9.00	822.84	111.19
December, 1900:							
Laying out the road from Caunao to Manicaragua, aligned, staked, and leveled.	Kilom ..	8,800	668.01	23.42	5.40	706.83	80.32
Survey of the river Manati for the establishment of a ferry.	.....	.....	109.99	.....	.....	109.99	.....
Total .....	.....	.....	778.00	23.42	52.40	816.82	.....
<i>Semiannual résumé, July 1 to December 31, 1900.</i>							
Road from Caunao to Manicaragua, aligned, staked, and leveled.	Kilom ..	35,900	3,423.50	992.24	88.97	4,504.71	125.48
Survey of the river Manati for the establishment of a ferry.	.....	.....	109.99	.....	.....	109.99	.....
Total .....	.....	.....	3,533.49	992.24	88.97	4,614.70	.....
October, 1900:							
Excavation .....	M <sup>3</sup> .....	791	869.20	64.55	46.42	980.17	1.24
Rock excavation .....	M <sup>3</sup> .....	197½	595.40	44.37	31.92	671.69	3.40
Embankments .....	M <sup>3</sup> .....	898	1,230.60	90.77	65.28	1,386.65	1.54
Dry masonry .....	M <sup>3</sup> .....	8	30.99	2.02	1.46	34.47	4.31
Total .....	.....	.....	2,726.19	201.71	145.08	2,072.98	.....
November, 1900:							
Earth excavation .....	M <sup>3</sup> .....	1,010½	810.95	97.48	15.11	923.54	.913
Rock excavation .....	M <sup>3</sup> .....	308	596.90	85.67	13.28	795.85	2.583
Embankments .....	M <sup>3</sup> .....	878	881.86	106.35	16.49	1,004.70	1.144
Dry masonry .....	M <sup>3</sup> .....	35	53.48	5.91	.92	60.31	4.020
Total .....	.....	.....	2,443.19	295.41	45.80	2,784.40	.....

## Monthly report of progress of work—Continued.

## ROAD FROM CAUNAO TO MANICARAGUA—Continued.

Kind of survey.	Unit.	Executed.	Cost of—				Cost per unit.
			Per-sonnel.	Material.	Sundries.	Total.	
December, 1900:							
Rock excavation .....	M <sup>3</sup> .....	3474	\$578.54	\$31.55	\$12.04	\$622.13	\$1.791
Earth excavation .....	M <sup>3</sup> .....	1,090	1,059.42	58.44	22.30	1,140.16	1.046
Embankments .....	M <sup>3</sup> .....	550	468.14	26.88	10.26	505.28	.918
Total .....			2,106.10	116.87	44.60	2,267.57	.....
<i>Semiannual résumé, July 1 to December 31, 1900.</i>							
Earth excavation .....	M <sup>3</sup> .....	8,605	5,854.16	442.18	177.52	6,473.86	.753
Rock excavation .....	M <sup>3</sup> .....	906	2,305.73	190.45	68.38	2,564.56	2.600
Embankments .....	M <sup>3</sup> .....	8,080	5,597.77	432.41	181.03	6,211.21	.768
Dry masonry .....	M <sup>3</sup> .....	47	179.74	14.83	5.63	200.20	4.259
Total .....			13,937.40	1,079.87	432.56	15,449.83	.....

## HIGHWAY FROM TRINIDAD TO CASILDA.

August, 1900:							
Grading .....	M <sup>2</sup> .....	4,735	\$719.60	\$8.40	\$12.50	\$740.50	\$0.156
Stone carted .....	M <sup>3</sup> .....	393	412.35	20.40	557.88	990.63	1.429
Stone crushed .....	M <sup>3</sup> .....	500	874.98	3.90	20.00	898.88	1.797
Stone spread .....	M <sup>3</sup> .....	561	45.85	.90	3.25	50.00	.089
Rolled .....	M <sup>2</sup> .....	1,840	126.39	39.51	35.25	201.15	.109
Total .....			2,179.17	73.11	628.88	2,881.16	.....
September, 1900:							
Grading .....	M <sup>2</sup> .....	5,017	833.07	10.00	93.33	936.10	.186
Stone carted .....	M <sup>3</sup> .....	764	367.53	25.00	352.81	745.34	.975
Stone crushed .....	M <sup>3</sup> .....	612	892.43	6.39	12.00	910.82	1.488
Stone spread .....	M <sup>3</sup> .....	509	37.25	2.00	1.75	41.00	.080
Rolled .....	M <sup>2</sup> .....	1,672	81.50	55.68	41.25	178.43	.106
Total .....			2,211.78	99.07	501.14	2,811.69	.....
October, 1900:							
Grading .....	M <sup>2</sup> .....	5,574	1,079.29	15.00	315.60	1,409.99	.253
Stone carted .....	M <sup>3</sup> .....	800	502.20	16.60	455.96	974.76	1.218
Stone crushed .....	M <sup>3</sup> .....	650	1,259.60	13.40	18.00	1,361.00	2.094
Stone spread .....	M <sup>3</sup> .....	904	81.45	6.15	4.75	92.35	.113
Rolled .....	M <sup>2</sup> .....	2,970	96.45	72.53	52.75	221.73	.081
Total .....			3,018.99	123.68	847.06	4,059.83	.....
November, 1900:							
Grading .....	M <sup>2</sup> .....	4,587	762.12	7.56	142.00	911.68	.198
Stone carted .....	M <sup>3</sup> .....	920	468.30	4.25	355.71	828.26	.900
Stone crushed .....	M <sup>3</sup> .....	820	797.51	159.00	9.56	966.01	1.178
Stone spread .....	M <sup>3</sup> .....	1,095	344.00	4.25	3.75	352.00	.321
Rolled .....	M <sup>2</sup> .....	3,596	95.00	33.01	51.25	179.26	.049
Total .....			2,466.93	208.07	562.27	3,237.21	.....
December, 1900:							
Grading .....	M <sup>2</sup> .....	3,473	372.18	25.60	51.25	448.43	.129
Stone carted .....	M <sup>3</sup> .....	600	511.90	25.00	350.65	887.55	1.480
Stone crushed .....	M <sup>3</sup> .....	550	676.75	11.55	11.00	699.30	1.211
Stone spread .....	M <sup>3</sup> .....	1,177	280.00	8.21	3.25	291.46	.247
Rolled .....	M <sup>2</sup> .....	3,863	94.65	39.01	26.25	159.91	.041
Total .....			1,935.48	108.77	442.40	2,486.65	.....
<i>Semiannual résumé, July 1 to December 31, 1900.</i>							
Grading .....	M <sup>2</sup> .....	23,386	3,766.36	65.96	614.38	4,446.70	.190
Stone carted .....	M <sup>3</sup> .....	3,777	2,262.28	91.25	2,073.01	4,426.54	1.171
Stone crushed .....	M <sup>3</sup> .....	3,132	4,501.27	264.24	70.50	4,836.01	1.544
Stone spread .....	M <sup>3</sup> .....	4,246	788.55	21.51	16.75	826.81	.194
Rolled .....	M <sup>2</sup> .....	13,941	493.99	239.74	206.75	940.48	.067
Total .....			11,812.45	682.70	2,981.39	15,476.54	.....

*Monthly report of progress of work—Continued.*

## WATER SUPPLY FOR CASILDA.

Kind of survey.	Unit.	Executed.	Cost of—				Cost per unit.
			Per- sonnel.	Material.	Sundries.	Total.	
December, 1900: Ditch digging, laying of pipes and covering . . . . .	M <sup>1</sup> . . . . .	1,629 <sup>1</sup>	\$351.45	\$705.73	\$36.87	\$1,094.05	\$0.671

*Expenses of the head office from July 1 to December 31, 1900.*

Months.	Salaries.	Material.	Rent.	Total.
July . . . . .	\$448.33	\$25.00	\$27.25	\$500.58
August . . . . .	448.33	25.00	27.25	500.58
September . . . . .	448.33	25.00	29.08	502.41
October . . . . .	448.33	25.00	30.00	503.33
November . . . . .	448.33	25.00	30.00	503.33
December . . . . .	448.33	25.00	30.00	503.33
Total . . . . .	2,689.98	150.00	173.58	3,013.56

## OFFICE OF THE DEPARTMENT OF PUBLIC WORKS,

*Puerto Principe, January 10, 1901.*

SIR: I have the honor to forward detailed report of the works, surveys, and other operations effected by this department during the semiannual period ending December 31, 1900.

At the beginning of the month of July this office was not yet furnished with the necessary personnel and instruments for effecting the surveys which were to lead to the execution of the works, this state of affairs continuing up to the middle of August, at which time the work of survey for highways and bridges, as detailed below, commenced, continuing without interruption.

It has been exceedingly difficult to find the competent personnel for the essentially technical labor; and even at this writing this office lacks an assistant engineer to divide the labor of preparing surveys and constructions in two departments, which same would be better cared for, leaving more time to the chief engineer of the district for the performance of the other duties connected therewith.

The technical personnel in charge of the clerical work, which at first was new to its duties, has acquired a certain degree of experience, and with its assistance the technical work so far done has been carried to a satisfactory termination.

With the existing personnel the following surveys have been made:

	Kilometers.
On the public road from Puerto Principe to Santiago de Cuba . . . . .	20
On the public road from Puerto Principe to Santa Cruz del Sur . . . . .	40
On the public road from Nuevitas to San Miguel . . . . .	5
In Minas, to establish a drainage canal of 500 meters, there were studied 2.50 kilometers. .	2.50
Total . . . . .	67.50

The total costs of these surveys, as per statement, has been \$4,242.39, costing at the rate of \$62.84 per kilometer. This amount, which appears excessive, is, without doubt, due to the fact that there has been charged thereto the value of the instruments and the transportation, and the cost has been further increased by the lack of experience at the beginning, on the part of the assistants charged with the direction of the work.

## SURVEYS OF BRIDGES.

The surveying party in charge of bridge work has made the surveys for the following bridges: Fundicion, Habana road; Guariao, Contramaestre, Guasimas, and Seibabo, on the road to Santa Cruz del Sur. Previous to the month of July a survey had been made for a bridge on the Saramaguacan River. The total expenses incurred in the above surveys, excluding that of Saramaguacan River bridge, amounted to \$2,547.37. In this amount are included the cost of instruments, draftsmen, horses, etc.

## CONSTRUCTION WORK.

At the time that this office took charge of the public works of this province, at the end of July (which up to that time were in charge of the military engineers), an appropriation had been made for the construction of a drainage canal at the village of Las Minas, amounting to \$1,000; also an appropriation for repairing the highways leading out of the city of Puerto Principe, amounting to \$2,000, and another for the repairing of the highway between Nuevitas and Puerto Principe, amounting to \$2,000. For these reasons preference was given to the above, the drainage canal of Las Minas having been finished, and the highway from Puerto Principe to Santiago de Cuba being still under construction. In this highway the military engineers had prepared the roadbed of the first 4 kilometers. The highway has been extended to the sixth kilometer, the only work to be done now being the metaling and side ditches. The highway between Nuevitas and the village of San Miguel was commenced about the end of November, the construction of same proceeding very slowly, due to the small appropriation for same and the total absence of proper machinery. Finally, on the 9th of November a contract was signed with Mr. Sacramento Zayas for the repair and construction of 17 bridges specified below: Repairing of the wooden bridges with masonry piers on the road to Habana. Bridges over the following-named streams, viz, Piedras, Hicacos, Blanco, Callejon de Urabo, El Platano, Lazaro y Burro. Repairing of the wooden bridges on masonry piers on the road to Santiago de Cuba. Bridges over the Imias and Sibanicu creeks. Construction of a wooden bridge, on masonry foundations, over the Seibabo creek, on the road to Santiago de Cuba, via El Jaguey. Repairing of the masonry bridges situated in the suburbs of the city of Puerto Principe, over the following-named creeks: Mendez, Carrasco, Santa Cruz, Juan de Toro, and Tinima. Construction of a wooden bridge, on masonry foundation, over the La Yaba Creek, on the road to Santa Cruz. Reconstruction of the superstructure of the wooden bridge over the Cascorro River. The above construction works commenced but a short while ago, are nevertheless quite advanced, and were contracted for at the prices stipulated in the following detailed statement:

## Repairing the bridge on the creek—

Piedras .....	\$420. 50
Hicacos .....	130. 50
Blancos .....	95. 00
Urabo .....	95. 00
El Platano.....	113. 00
El Burro .....	150. 00
Lazaro .....	126. 00
Sibanicu .....	223. 00
Mendez .....	996. 00
Carrasco .....	573. 00
Santa Cruz.....	377. 00
Juan de Toro .....	382. 00
Tinima .....	27. 00
Cascorro .....	101. 50
To clean the approaches to the same bridge.....	43. 00

For the other work to be done on the bridges over the Imias, Cascorro, Seibabo, and La Yaba creeks, the prices which will rule are as follows:

Native hard wood, in place .....	per cubic meter.. \$43. 00
Rubble masonry, with hydraulic mortar for foundations.....	do. 12. 50
Brick masonry with lime mortar .....	do. 14. 50
Rammed embankment.....	do. 70
Earth excavation, including transportation .....	do. 50
Paving, with stone.....	per square meter. 2. 20
Painting three coats .....	do. 29
Wrought iron .....	per kilogram. 28

Besides the above, this office, aided by the technical personnel, has effected the following work: Inspection and examination of the work delivered by the military engineers, on the Santiago de Cuba and Santa Cruz highway; examination of the highway to Santiago de Cuba from Puerto Principe, as far as the boundaries of the province, on the Jobabo River; examination of the Lesca road over the Cubita Mountains; examination of the crossing of the Saramaguacan River to determine the location of the bridge, and various inspections of the railroad and of the works under construction.

## OFFICE WORK.

All current matters have been dispatched, and, besides, a report has been made as to the economic conditions and rates of the railroad from Puerto Principe to Nuevitas; estimates have been prepared of the first 8 kilometers of the road from Puerto Principe to Santiago de Cuba and also of the bridges over Guariao, Contramaestre, and Saramaguacan creeks.

Among the sketch work done is the preparation of topographical plans and profiles of 20 kilometers on the Santiago de Cuba highway; 5 kilometers on the highway from Nuevitas to San Miguel; 40 kilometers on the highway to Santa Cruz del Sur, and the drainage canal of Las Minas, with part of the plan of that village. Furthermore, there have been made the plans of the bridges, already mentioned, of Guariao, Contramaestre, and Saramaguacan; also the topographical part of the survey of the bridges of La Fundicion, Las Guasimas, and Seibabo creeks, on the road to Santa Cruz del Sur, which have not been forwarded as yet.

There are pending the following works, which, having been ordered by superior authority, remain still pending: A new examination of the Saramaguacan River; survey for the bridge over the Guaimaro River, which has been requested by the civil governor, and another survey over the bridge on the Paso de la Volanta Creek, requested by the town council. In this connection I have to state that the delay in dispatching some of the matters intrusted to this office principally depends on the absence of a technical employee who could assist in the preparation of pending projects, as the sole assistant at present in this office has barely time enough to attend to the surveys which are made on bridges and highways, and the construction work which is being effected simultaneously in Nuevitas, in this city (Santiago de Cuba road), and the various water courses where bridges are being repaired or constructed, and, within a few days, in the Lesca road over the Cubita Mountains. Considerable difficulty has been experienced in construction work for the lack of proper means and road machinery, which naturally tends to delay the final execution thereof. At the present time the highway to Santiago de Cuba, as also that of Nuevitas to San Miguel, advances very slowly for the same reason. It is therefore advisable, to expedite this work and to assure its future maintenance, to furnish this office with a stone crusher, 1 kilometer of portable railway, with 4 tilting cars; 1 steam road roller and 2 smaller ones of 4,000 pounds each, the latter being very necessary to prepare the roadbed in the thick strata of alluvial earth or clay grit which is so abundant in this district, and which, once removed, it is very difficult and expensive to level and harden with the heavy 7-ton road rollers at the disposal of this office.

The general conditions in the province, in so far as they refer to the reconstruction of its resources and the establishment of means of communication, have remained almost stationary since the termination of the war, and, therefore, the same necessities referred to in the last report are still felt. Furthermore, the tide of travel has become more fixed along certain routes, and accepting same as an indication of which roads should receive preferable attention, the following, in the order of their importance, are deemed the most advantageous: Highway to Santiago de Cuba; highway to Santa Cruz, del Sur; highway to Habana via San Geronimo; and to Nuevitas, the highway to San Miguel, which is very much used, and connects Sibanicu, Cascorro, and Guaimaro with the port of Nuevitas.

The following construction work is therefore suggested as being of the utmost importance: On the highway to Santiago de Cuba the highway should be constructed to the twelfth kilometer in order to avoid the use of that section of road known as "Monte del Horno;" leveling the Vista Hermosa and El Jaguey Hill; construct that part of the highway between Sibanicu and Cascorro, about 7 kilometers long, the condition of which is bad beyond description; construct two culverts necessary before reaching Sibanicu; another one over the El Medio Creek, between Sibanicu Coscorro, of which a survey has been ordered, and, lastly, the bridge over the Guaimaro River, of which the survey has also been ordered.

In conclusion, by constructing about 14 kilometers of highway and 4 bridges, at a total cost of \$100, approximately, communication will be established all the year round between this province and that of Santiago de Cuba, without any danger, as the greater part of said highway rests on hard soil. The road to Santa Cruz del Sur follows in importance, the proposed location of which will be almost in its entire length on low lands, having a deep vegetable strata and crossed by a great number of water courses. The highway to San Miguel and Nuevitas is also of considerable importance, as it is the only means of communication between the south and southeast districts with the port of Nuevitas, in which district are situated the villages of Sibanicu, Cascorro, and Guaimaro. This section of highway (between San Miguel and Nuevitas) rests on a soil of clay grit, exceedingly low and almost impassable during eight months of the year. In addition to the bridge over the Saramaguacan River, another one should be constructed over the La Mula Creek, the latter preventing traffic for many days at a time. Lastly, the highway to Habana via San Geronimo, in its first section, just leading out of the city, is one of the roads admitted by all to be one of the worst of the province, and it would be of incalculable benefit to all of the Tinima district, through which this highway crosses, if the first 20 kilometers were constructed.

The following surveys are therefore advisable: The highway from Nuevitas to San

Miguel as far as the last-named village of San Miguel; survey of 20 kilometers on the highway to Habana via San Geronimo; finish the survey of the Santa Cruz del Sur highway; survey the section of the Santiago de Cuba highway between Sibanicu and Cascorro.

In regard to bridges, the survey of four of them on the Santiago de Cuba highway should be made as follows: Over El Platano Creek, Juan Gomez Creek, El Medio Creek, and Guaimaro Creek. On the highway from Nuevitas to San Miguel, over the La Mula Creek. On the Santa Cruz highway a survey should be made over the most important, which are as follows: La Larga, Najasa, Burenes, Santa Cecilia, Ceibabo, and Ingenio Viejo creeks. On the highway to Habana in its first section the creeks are of little importance. Several of these bridges, like those of Santa Cecilia and Burenes, will probably have a span of over 100 English feet, in which case I take the liberty of recommending that they be constructed of steel.

I consider of great importance, and request that it be given due consideration, the necessity of putting in force the regulations relative to the dimensions of the vehicles which make use of the newly constructed highways, and in so far as refers to the giving of the right of way; inasmuch as the said vehicles are large and cumbersome and their movements difficult they destroy the stones on either side forming the base of the roadway. Also, relative to the policing and maintenance of the highway.

I beg to inclose you six detailed statements of the work effected by this office during the semiannual period, and several photographic views of the highway under construction from this city to Santiago de Cuba.

Respectfully,

POMPEYO SARIOL,  
Chief Engineer.

The SECRETARY OF PUBLIC WORKS, Habana.

*First semiannual statement, 1900 to 1901, of total expenses and disbursements in Puerto Principe during the above period, by months and general items.*

Months.	Office expenses.	General surveys.	Construction of a canal at Minas.	Construction of the highway to Santiago de Cuba.	Construction of the highway from Nuevitas to San Miguel.	Construction and repairs of bridges of the province.	Deficit of previous year.	Re-funded to treasury.	Total.
July .....	\$496.83	\$275.50							\$772.33
August .....	513.28	1,186.08	\$111.15	\$2,332.91					3,143.42
September .....	520.63	1,500.18	507.50	2,954.11					5,482.42
October .....	518.33	1,156.44	580.71	2,966.80					5,226.03
November .....	496.38	1,379.72		4,372.72	\$584.10	\$2.00	\$3.75		6,834.92
December .....	535.68	1,291.84		4,064.31	1,324.71			\$360.64	7,577.18
Total ....	3,081.13	6,789.76	1,199.36	15,690.85	1,908.81	2.00	3.75	360.64	29,036.30

#### RECAPITULATION.

Months.	Expenses.	Appropriations.
July .....	\$772.33	\$7,038.38
August .....	3,143.42	2,213.33
September .....	5,482.42	6,513.33
October .....	5,226.03	6,327.08
November .....	6,834.92	9,513.33
December .....	7,577.18	12,363.33
Total .....	29,036.30	43,968.73

Total balance on hand from all sources December 31, 1900, \$14,932.43.



*First semiannual statement, 1900 to 1901, detail of expenditures in Puerto Principe, by months and general and partial items.*

	Partial items.					
	Personnel.	Station- ery sup- plies.	Rent of build- ings.	Construc- tion ma- terials.	Instru- ments.	Transpor- tation.
July, 1900:						
Office .....	\$448.33	\$8.50	\$40.00			
General surveys .....	275.50					
Total .....	723.83	8.50	40.00			
August, 1900:						
Office .....	448.33	24.95	40.00			
General surveys .....	684.32					
Canal at Minas .....	111.15					
Highway to Santiago de Cuba .....	1,175.69		15.00			
Total .....	2,419.49	24.95	55.00			
September, 1900:						
Office .....	448.33	27.50	40.00			
General surveys .....	982.00				\$347.18	
Canal at Minas .....	507.30					
Highway to Santiago de Cuba .....	2,103.62		10.00	\$756.00		\$82.50
Total .....	4,041.25	27.50	50.00	756.00	347.18	82.50
October, 1900:						
Office .....	448.33	30.00	40.00			
General surveys .....	978.74					22.00
Canal at Minas .....	439.64			109.35		2.02
Highway to Santiago de Cuba .....	2,481.38		10.00	12.67		
Total .....	4,348.09	30.00	50.00	122.02		24.02
November, 1900:						
Office .....	448.33	8.05	40.00			
General surveys .....	929.56				55.75	40.00
Highway to Santiago de Cuba .....	2,351.55		10.00	1,270.66		
Highway, Nuevitas to San Miguel .....	417.65				3.75	
Total .....	4,147.09	8.05	50.00	1,270.66	59.50	40.00
December, 1900:						
Office .....	448.33	47.35	40.00			
General surveys .....	953.50					54.00
Highway to Santiago de Cuba .....	2,748.36		10.00	418.30		
Highway, Nuevitas to San Miguel .....	1,059.21					
Total .....	5,209.40	47.35	50.00	418.30		54.00
Amounts .....	20,889.15	146.35	295.00	2,566.98	406.68	200.52

*First semiannual statement, 1900 to 1901, detail of expenditures in Puerto Principe, by months and general and partial items—Continued.*

	Partial items.					
	Rations.	Furniture, implements, apparatus, tools.	Traveling expenses.	Other items.	Extra work.	Total, by months.
July, 1900:						
Total.....						\$772.33
August, 1900:						
General surveys.....	\$106.26				\$395.50	
Highway to Santiago de Cuba.....		\$115.47			26.75	
Total.....	106.26	115.47			422.25	3,143.42
September, 1900:						
Office.....			\$4.80			
General surveys.....	171.00					
Canal at Minas.....		.20				
Highway to Santiago de Cuba.....		1.99				
Total.....	171.00	2.19	4.80			5,482.42
October, 1900:						
General surveys.....	155.70					
Canal at Minas.....			11.70		18.00	
Highway to Santiago de Cuba.....					462.75	
Deficit of previous year.....				\$3.75		
Total.....	155.70		11.70	3.75	480.75	5,226.03
November, 1900:						
General surveys.....	173.10	181.31				
Highway to Santiago de Cuba.....		125.50			615.01	
Highway, Nuevitas to San Miguel.....		97.50	3.20		62.00	
Bridges of the province.....				2.00		
Total.....	173.10	404.31	3.20	2.00	677.01	6,834.92
December, 1900:						
General surveys.....	150.99	33.35			100.00	
Highway to Santiago de Cuba.....		88.40			799.25	
Highway, Nuevitas to San Miguel.....		35.00			230.50	
Returned to the treasury.....				360.64		
Total.....	150.99	156.75		360.64	1,129.75	7,577.18
Amounts.....	757.05	678.72	19.70	366.39	2,709.76	29,036.30

*First semiannual period, from 1900 to 1901, expenses incurred in general surveys in district of Puerto Principe during above period.*

	Personnel.	Tools.	Rations.	Extra work and transportation.	Furniture, implements, tools.	Total.	Work performed.	Cost of work per kilometer.
							<i>Kilometers.</i>	
Surveys for highways.....	\$2,790.71	\$402.93	\$441.59	\$392.50	\$214.66	\$4,242.39	67½	\$62.84
Surveys for bridges.....	2,012.91		315.46	219.00		2,547.37	34	74.92
Total.....	4,803.62	402.93	757.05	611.50	214.66	6,789.76	101½	66.90

NOTE.—In this statement there have been included in extra work the two items of the general statement specified as transportation and extra work.

*Statement showing cost of all work performed in the province of Puerto Principe, district of Puerto Principe, during the semiannual period from 1900 to 1901.*

Designation of work.	Cost of work by units.					
	Embankment (m <sup>3</sup> ).	Excavation.		Broken stone (m <sup>2</sup> ).	Rolling (m <sup>2</sup> ).	Laying of curbstone (m).
		Earth (m <sup>2</sup> ).	Rock (m <sup>3</sup> ).			
Roads leading from Puerto Principe highway to Santiago de Cuba	\$0.31	\$0.47	\$0.60	\$0.40	\$0.07	\$0.13
Highway from Nuevitas to San Miguel	.26	.39	.63			
Drainage canal at Minas			.75			

*Statement showing cost of materials used in work performed in the province of Puerto Principe, district of Puerto Principe, during the semiannual period of 1900 to 1901.*

Designation of work.	Stone (m <sup>3</sup> ).	Crushed stone (m <sup>3</sup> ).	Pine wood (per M).	Hard wood (per M).	Bricks (per M).
Roads leading from Puerto Principe	\$2.90	\$2.48	\$31.00		\$16.00
Highway to Santiago de Cuba					
Highway from Nuevitas to San Miguel					
Drainage canal at Minas			31.00	\$30.00	

*Statement showing salaries and wages paid for all work in the province of Puerto Principe, district of Puerto Principe, during the semiannual period from 1900 to 1901.*

Designation of work.	Assistant engineer.	Transitman.	Levelman.	Draftsman.	Chainman.	Rodman.	Inspector.	Clerk.	Foreman.	Carpenter.	Smith.	Warehouseman.	Laborers.
General surveys	\$125.00	\$100.00	\$80.00	\$60.00	\$2.00	\$2.00							\$1.00
Highway to Santiago de Cuba							\$83.33	\$50.00	\$50.00	\$1.50	\$1.50	\$40.00	.85
Highway from Nuevitas to San Miguel							83.33	2.00	2.00		1.50		.88
Drainage canal at Minas									50.00				.85

OFFICE OF THE DEPARTMENT OF PUBLIC WORKS,  
Santiago de Cuba, January 7, 1901.

SIR: Inclosed, and for the purpose of forwarding same to the honorable secretary of the department, I have the honor to hand you a report of surveys made and works constructed in this district from July 1 to December 31 of last year, as requested by you in circular No. 54, dated December 13 ultimo.

Yours, respectfully,

J. M. PORTUONDO,  
Chief Engineer.

The DIRECTOR-GENERAL OF THE DEPARTMENT OF PUBLIC WORKS.

*Report covering semiannual period, July 1 to December 31, 1900.*

During the six months ending December 31, 1900, the hereinafter described works and surveys were made.

## SURVEYS.

## HIGHWAY FROM SAN LUIS TO HOLGUIN.

On the 9th of July the field work commenced for the highway between San Luis and Holguin, being finished on the 23d of August, covering a distance of 108,019 meters, making the daily progress of the work 2.5 kilometers. This survey was made in a preliminary form, following as much as possible the public highway having the greatest amount of traffic. The preliminary studies corresponding to the first two sections of 30 kilometers have been forwarded to the director-general, same being in the most complete form possible, considering that they serve as the basis for the preparation of the final project of this highway when it shall be so directed. The preliminary study of section 3 is almost finished, but for the present the clerical work thereon has been suspended for the reason that the surveying party having the matter in hand is now at work securing information and preparing plans for bridges.

## HIGHWAY FROM SANTIAGO DE CUBA TO SAN LUIS.

*Section between Puerto de Boniato and Dos Caminos, 2 kilometers.*—The necessary field work for the final project covering the construction of this highway commenced on July 25, but was suspended on August 28 by order of the military governor of the island, the work continuing under the direction of the military engineers of the department. Copies of the sketch showing the location and longitudinal profiles were forwarded to the director-general and to the department of military engineers, the transverse profiles not being sent on account of the order directing the suspension of the work.

## HIGHWAY FROM SANTIAGO DE CUBA TO SONGO.

By direction of the secretary of public works, on August 28 the field work was commenced for the preparation of the final project covering the construction of the highway from Santiago de Cuba to Songo, said highway beginning at a point on the highway between Santiago de Cuba and San Luis, near Boniato, passing by the villages of San Vicente, Dos Bocas, and El Cristo, ending at Songo. The plan of the Boniato River and of an extensive section of ground was prepared and forwarded for the approbation of superior authority, the project being to cross said river at two distinct points referred to in the plans. The crossing of said river at one of the points designated in the plan being approved, the final project for the two first kilometers was prepared, same having to be reduced to 1,700 meters by virtue of the appropriation granted for this work amounting to \$12,000. The final project being approved on November 30, the necessary documents were prepared to advertise for bids for the construction of the work. Bids will be opened on February 9. The final surveys for the highway were continued, and on December 21 the complete project was forwarded to the director-general, same covering the second section of 2 kilometers, which ends at a point between the villages of San Vicente and Dos Bocas.

## GENERAL REPAIRS TO HIGHWAYS.

Inspections have been made on the highways from Banes to Bijaru and from Banes to Los Berros, with the view of making repairs thereon, and the preliminary studies necessary have been prepared for the construction of hardwood bridges over the Veguita and Casquera streams and for repairs to other water crossings, the necessary appropriation having been asked for same. An inspection has been made and necessary appropriation asked for, covering repairs to the highway between Santiago de Cuba and Caney and Jauco, which was applied for by various proprietors in the district.

## BRIDGES.

*Bridge over the Mao River.*—The final project has been prepared for the construction of a bridge made of steel with a span of 12 meters, on a concrete base, with the main girders (Pony) riveted, Warren system, over the Mao River on the highway between Santiago de Cuba and El Cristo, near the village of San Vicente, said final plans having been forwarded to the director-general on the 4th of December. The necessary documents are at present being printed to advertise for bids for the construction of this work.

*Bridge over the Aguacate River.*—The final project has been made for the construction of a steel bridge of 16 meters span on a concrete base, main girders (Pony) riveted, Warren system, to be built over the Aguacate River on the road between

Santiago de Cuba and El Cristo near the village of San Vicente. Same was forwarded to the director-general on December 4, and the necessary documents are printed to advertise for bids for the purpose of awarding the contract.

*Bridge over the Boniato River.*—The preliminary project is being prepared for a metal bridge with masonry foundation, and a span of 32 meters, to be built over the Boniato River. Also another preliminary project at the same point, but with three spans, near the point where the highway from Santiago de Cuba to Songo will commence, at the point where the San Luis highway branches off.

#### WHARVES.

*Wharf of the Port of Baracoa.*—By direction of the military governor of the island a plan for the reconstruction and widening of the government wharf at Baracoa was prepared, to be of native hard woods, and a pine shed on same. Same was forwarded to the director-general on November 2, no action having thus far been taken thereon.

#### WORK PERFORMED.

*Reconstruction of the government wharf at Caimanera, Guantanamo.*—On the 31st of May the contract for the repairs to the government wharf at Caimanera, Guantanamo, was awarded to Mr. Eduardo J. Chibas, for which an appropriation had been granted of \$15,587.12, same being increased \$10,000 more on August 9. Work began on June 14 and was concluded on September 25, on which date the final measurements were made by direction of the director-general of the department, same being considered as the provisional acceptance of this work. The following is a statement of the construction in detail.

#### TIMBERWORK.

738 lineal meters of piling of 16 meters.  
600 lineal meters of piling of 15 meters.  
518 lineal meters of piling of 14 meters.  
208 lineal meters of piling of 13 meters.  
252 lineal meters of piling of 12 meters.  
66 lineal meters of piling of 11 meters.  
190 lineal meters of piling of 10 meters.  
324 lineal meters of piling of 9 meters.

440 lineal meters of piling of 8 meters.  
182 lineal meters of piling of 7 meters.  
527 lineal meters crossbeams of 0.30 by 0.25.  
811 lineal meters in stringer pieces of 0.30 by 0.25  
500 lineal meters in stringer pieces of 0.25 by 0.20  
39 lineal meters in posts of 0.25 by 0.25.  
350 lineal meters in stringers of 0.20 by 0.10.  
1,334 meters (square) in planks 0.20 by 0.05.

#### IRON FITTINGS.

One thousand kilograms in shoes. Eighty kilograms in hoops. One thousand four hundred and ninety-one kilograms of nails.

The lumber employed was as follows: Piles, Jucaro and Jatia; crossbeams and stringers, Caguairan, Yaba, and Caguani; flooring planks, pine.

#### REMOVAL OF A DAM FORMED IN THE BUEY RIVER.

In the Buey River, near the village of Veguita, a dam was formed of timber, earth, and trees, which were carried by the river in its risings and which afterwards remained deposited there. To this was added various smaller dams made by the residents along the river for the purpose of securing water. This natural dam reached such proportions that during the last few years every time there was a rise in the Buey River the village of Veguita was inundated. For this reason the secretary of public works ordered the immediate removal of said dam. Work began on the 17th of November and finished the 8th of December. The river was cleaned for a distance of 847 meters. The volume of earth and timber extracted amounted to 9,158.41 cubic meters. As a result of the river being freed of obstacles, the flow of waters was uninterrupted and all danger threatening the town of Veguita disappeared.

The foregoing is a detailed statement of the work performed and services rendered in this district during the semiannual period above referred to, in compliance with the orders received and with the means at my command.

J. M. PORTUONDO,  
Chief Engineer.

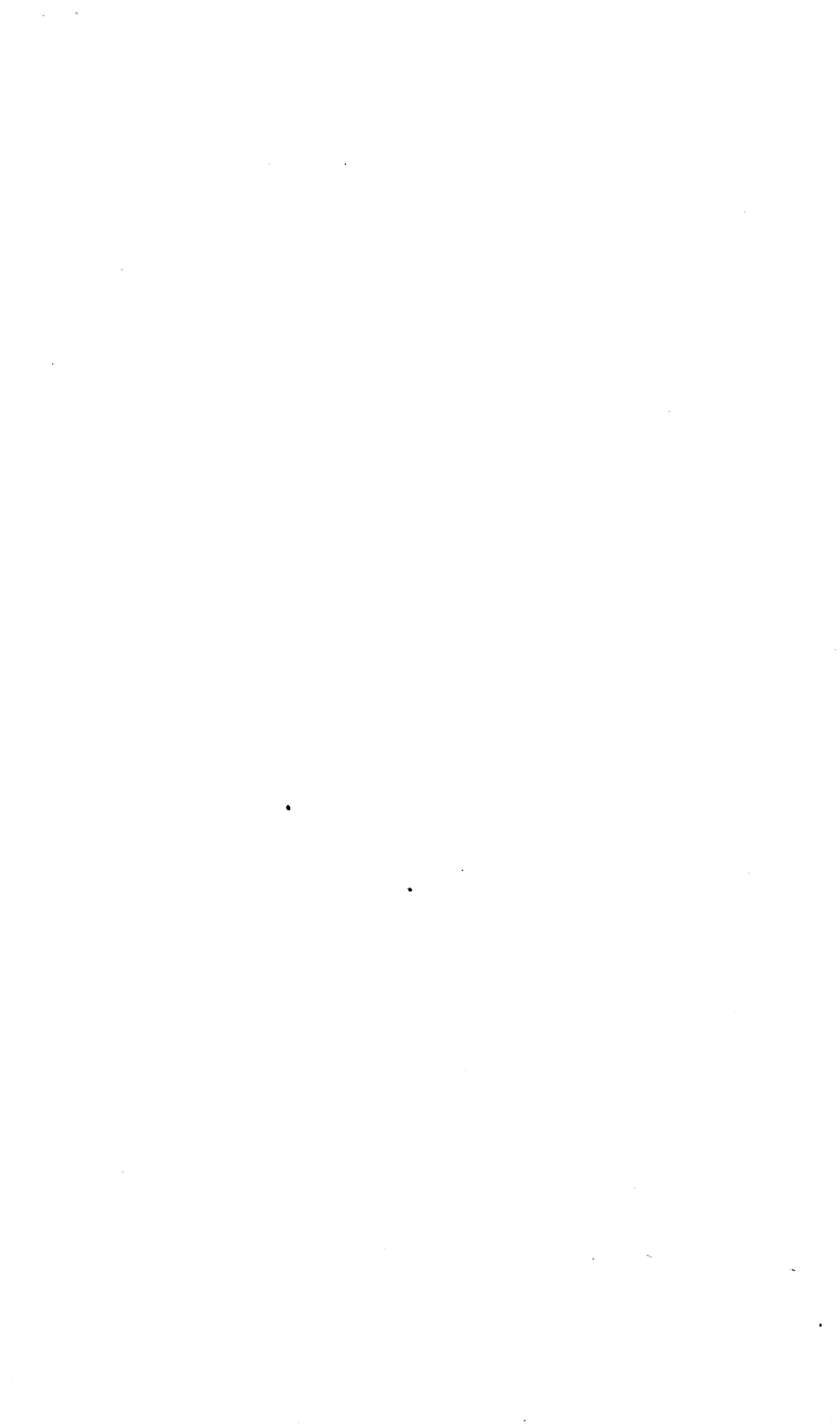
SANTIAGO DE CUBA, *January 7, 1901.*

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